

# Exhibit 1



**The asserted claims, Defendants' proposed constructions, and supporting evidence**

Claims 1–4 <sup>1</sup>	Claim 9	Term/Phrase for Construction	Proposed Construction	Support
1. A method for assisting a user in identifying a subfamily of items within a family of items <u>said method performed with a server connected to a client computer through a computer network</u> , comprising the steps of:	9. A method for assisting a user in identifying a subfamily of items within a family of items, <u>the method comprising the following steps of which are performed with a server connected to a computer network</u> :	1. Preamble  claims 1 and 9	The preamble limits the claim, and “user” means a person using a computer	<ul style="list-style-type: none"> <li>• Ex. 2, '821 patent at 5:31–:34, 18:11–19:35</li> <li>• '821 Reexamination, Ex. 16, at 3</li> <li>• '444 Prosecution, No. 8, Danish Affidavit, at 2</li> </ul>
(a) providing a computer readable data file of stored information representing at least one family of items, said data file identifying at least one alternative for each item,	(a) providing a computer readable data file of stored information representing at least one family of items, said data file identifying at least one alternative for each item,	2. “computer readable data file of stored information”  claims 1 and 9	“a collection of data—text, numbers, or graphics—in a non-volatile storage medium which can be read by a computer”	<ul style="list-style-type: none"> <li>• Ex. 21, Joint Claim Construction and Prehearing Statement in <i>PartsRiver, Inc. v. Shopzilla, Inc.; Yahoo! Inc.; Pricegrabber.com, Inc.; eBay Inc.; and Microsoft Corporation</i>, No. 07-440 (E.D. Tex. Dec. 15, 2008) [Docket No. 141]</li> <li>• Ex. 2, '821 patent at 1:23–:30, 5:58–:62, 6:61–:64, 11:1–:4, 12:39–:43, 18:11–:17, 18:26–:29, Fig. 12</li> <li>• Ex. 18, <i>McGraw-Hill Dictionary of Scientific and Technical Terms, Fifth Edition</i> (1994): “store”</li> <li>• Ex. 17, <i>Microsoft Press Computer</i></li> </ul>

<sup>1</sup> Additions to reexamined claims 1 and 9 (as compared to original claim 1) shown by underlining and deletions shown by ~~strikethrough~~

Claims 1–4 <sup>1</sup>	Claim 9	Term/Phrase for Construction	Proposed Construction	Support
				<p><i>Dictionary</i> (2d ed. 1994): "data file"</p> <ul style="list-style-type: none"> <li>• Ex. 16, <i>Webster's Ninth New Collegiate Dictionary</i> (1991): "file"</li> </ul>
		<p>3. "family of items"</p> <p>claims 1 and 9</p>	<p>"a collection of [items] with specific qualifiers and/or attributes, where one would want to identify [items] by specifying its qualifiers and/or attributes"</p>	<ul style="list-style-type: none"> <li>• Ex. 21, Joint Claim Construction and Prehearing Statement in <i>PartsRiver, Inc. v. Shopzilla, Inc.; Yahoo! Inc.; Pricegrabber.com, Inc.; eBay Inc.; and Microsoft Corporation</i>, No. 07-440 (E.D. Tex. Dec. 15, 2008) [Docket No. 141]</li> <li>• Ex. 2, '821 patent at 2:56–3:5, 5:31–:49</li> </ul>
		<p>4. "subfamily of items"</p> <p>claims 1 and 9</p>	<p>"A collection of [items] from the family with at least one common qualifier and/or attribute"</p>	<ul style="list-style-type: none"> <li>• Ex. 21, Joint Claim Construction and Prehearing Statement in <i>PartsRiver, Inc. v. Shopzilla, Inc.; Yahoo! Inc.; Pricegrabber.com, Inc.; eBay Inc.; and Microsoft Corporation</i>, No. 07-440 (E.D. Tex. Dec. 15, 2008) [Docket No. 141]</li> <li>• Ex. 2, '821 patent at 3:35–:40, 7:46–:49, 8:6–:19, 8:63–:66</li> <li>• '444 Prosecution, No. 4, at 11</li> </ul>
		<p>5. "alternative for each item"</p> <p>claims 1 and 9</p>	<p>"a qualifier and/or attribute"</p>	<ul style="list-style-type: none"> <li>• Ex. 21, Joint Claim Construction and Prehearing Statement in <i>PartsRiver, Inc. v. Shopzilla, Inc.; Yahoo! Inc.; Pricegrabber.com, Inc.; eBay Inc.; and Microsoft Corporation</i>, No. 07-440 (E.D. Tex. Dec. 15, 2008) [Docket No. 141]</li> </ul>

Claims 1–4 <sup>1</sup>	Claim 9	Term/Phrase for Construction	Proposed Construction	Support
				• Ex. 2, '821 patent at 2:50–:62, 5:31–:47, 7:11–:17, Fig. 7
(b) reading said data file,	(b) reading said data file,			
(c) displaying a feature screen indicating said alternatives represented in the family,	(c) displaying a feature screen indicating said alternatives represented in the family, <u>wherein data is output to a client computer via said computer network,</u>	6. “displaying [a feature screen / at least one grouping]”  claims 1 and 9	“showing on the display device of the user’s computer [a feature screen/at least one grouping]”	<ul style="list-style-type: none"> <li>• Ex. 21, Joint Claim Construction and Prehearing Statement in <i>PartsRiver, Inc. v. Shopzilla, Inc.; Yahoo! Inc.; Pricegrabber.com, Inc.; eBay Inc.; and Microsoft Corporation</i>, No. 07-440 (E.D. Tex. Dec. 15, 2008) [Docket No. 141]</li> <li>• Ex. 2, '821 claims 1, 3, 4, 7, 8, 9</li> <li>• Ex. 2, '821 patent at 6:44–:47, 8:23–:27, 8:38–:50, 9:66–10:4, 17:61–:65, 18:9–:32, 18:49–19:12</li> <li>• Ex. 6, '444 claims 1, 14, 29, 30</li> <li>• '821 Reexamination, Ex. 4, at 4; <i>id.</i> Ex. 6, at 3; <i>id.</i> Ex. 8, at 3, 5; <i>id.</i> Ex. 15 at KS0000452, KS0000454–55</li> <li>• '444 Prosecution, No. 2, at 3; <i>id.</i> No. 4, at 11–12, 17–18; <i>id.</i> No. 8, Kimbrough Affidavit at 1–2 &amp; Ex. C; <i>id.</i> No. 8, Danish Affidavit at 2–3 &amp; Ex. C</li> <li>• Ex. 8, U.S. Patent No. 4,905,094 to Pocock et al. at 5:17–:24 &amp; Fig.2A, block 2</li> <li>• '821 Reexamination, Ex. 1, Granacki, <i>A Component Library Management</i></li> </ul>

Claims 1–4 <sup>1</sup>	Claim 9	Term/Phrase for Construction	Proposed Construction	Support
				<p><i>System and Browser</i>, § 1.3 &amp; Fig.2</p> <ul style="list-style-type: none"> <li>• Ex. 11, Danish Dep. at 111:11–112:13, 124:11–:21, 129:23–130:4 (Jan. 20, 2009)</li> <li>• Ex. 19, PartsRiver’s opposition to Defendants’ motion to transfer the action from the Eastern District of Texas to this Court, at 11 (Dec. 6, 2007) [Docket No. 45]</li> <li>• Ex. 20, PartsRiver’s oral argument in opposition to Defendants’ motion to transfer, at 10:9–11:2 (Apr. 10, 2008) [Docket No. 201-7]</li> <li>• Chandler Decl. Exs. Q &amp; R, the AMP Navigator “demonstration program” described in PartsRiver’s responses to Interrogatories Nos. 1 and 2 and produced at Bates number PA-NAT-000001</li> <li>• Ex. 26, Order Granting Defendants’ Motion for Summary Judgment, at 11:9–12:6 (Aug. 21, 2009) [Docket No. 234 in Case No. 09-811]</li> <li>• Chandler Decl., the declaration of Theodore W. Chandler and all cited and attached exhibits (May 28, 2009)</li> </ul>
		7. “said alternatives represented in the family”	“all the alternatives from the data file for the family of items”	<ul style="list-style-type: none"> <li>• Ex. 2, ’821 claims 1 and 9</li> <li>• Ex. 2, ’821 patent at 6:65–7:20, 8:5–:27. Fig. 7, Fig. 8</li> <li>• ’444 Prosecution, No. 4, at 17–18; <i>id.</i></li> </ul>

Claims 1–4 <sup>1</sup>	Claim 9	Term/Phrase for Construction	Proposed Construction	Support
		claims 1 and 9		<p>No. 8, Danish Aff. Ex. C</p> <ul style="list-style-type: none"> <li>• Chandler Decl. Exs. Q &amp; R, the AMP Navigator “demonstration program” described in PartsRiver’s responses to Interrogatories Nos. 1 and 2 and produced at Bates number PA-NAT-000001</li> <li>• Ex. 26, Order Granting Defendants’ Motion for Summary Judgment, at 11:9–12:6 (Aug. 21, 2009) [Docket No. 234 in Case No. 09-811]</li> <li>• Chandler Decl., the declaration of Theodore W. Chandler and all cited and attached exhibits (May 28, 2009)</li> </ul>
		<p>8. “feature screen”</p> <p>claims 1, 3, and 9</p>	“an image showing multiple alternatives within a family or subfamily”	<ul style="list-style-type: none"> <li>• Ex. 21, Joint Claim Construction and Prehearing Statement in <i>PartsRiver, Inc. v. Shopzilla, Inc.; Yahoo! Inc.; Pricegrabber.com, Inc.; eBay Inc.; and Microsoft Corporation</i>, No. 07-440 (E.D. Tex. Dec. 15, 2008) [Docket No. 141]</li> <li>• Ex. 2, ’821 patent at 3:63–:70, 4:24–:36, 7:1–:3, 7:11–:21, 8:19–:27, Figs. 7, 8, 9</li> <li>• Ex. 4, ’588 claims 1, 6, 7</li> <li>• Ex. 6, ’444 claims 1, 17, 29, 31</li> <li>• ’821 Reexamination, <i>id.</i> Ex. 6, at 3; <i>id.</i> Ex. 14, at 6, 8</li> <li>• ’444 Prosecution, No. 2; <i>id.</i> No. 12,</li> </ul>

Claims 1–4 <sup>1</sup>	Claim 9	Term/Phrase for Construction	Proposed Construction	Support
				Examiner's Amendment <ul style="list-style-type: none"> <li>• Ex. 11, Danish Dep. at 282–84 (Jan. 20, 2009)</li> <li>• Ex. 13, Danish Dep. Ex. 1028 at 13–17</li> </ul>
(d) accepting a first selection criteria of at least one alternative	(d) <u>receiving and accepting a first selection criteria of at least one alternative from said client computer, said first selection criteria being received by said server from said client computer via said computer network,</u>	9. “selection criteria”  claims 1 and 9	“selected alternative(s)”	<ul style="list-style-type: none"> <li>• Ex. 2, '821 claim 5</li> <li>• Ex. 2, '821 patent at 7:46–:53, 8:6–:14, 8:21–:38, 8:51–:54, 8:59–:66, 15:64–16:3, 16:17–:39, 18:64–19:9, Fig. 8</li> <li>• Ex. 6, '444 claim 1</li> <li>• '821 Prosecution, No. 5, at 5</li> <li>• '444 Prosecution, No. 4, at 11</li> </ul>
(e) determining a first subfamily of items wherein each said item in the first subfamily satisfies said first selection criteria,  (i) determining a second subfamily of items of the family wherein each item in the second subfamily satisfies said second selection criteria,	(e) determining a first subfamily of items wherein each said item in the first subfamily satisfies said first selection criteria,  (i) determining a second subfamily of items of the family wherein each item in the second subfamily satisfies said second	10. “determining a [first / second] subfamily”  claims 1 and 9	“searching for items that match the selection criteria”	<ul style="list-style-type: none"> <li>• Ex. 21, Joint Claim Construction and Prehearing Statement in <i>PartsRiver, Inc. v. Shopzilla, Inc.; Yahoo! Inc.; Pricegrabber.com, Inc.; eBay Inc.; and Microsoft Corporation</i>, No. 07-440 (E.D. Tex. Dec. 15, 2008) [Docket No. 141]</li> <li>• Ex. 2, '821 patent at 3:36–:39, 8:6–:19, 8:59–:67, 15:64–16:49, 17:19–:22</li> <li>• '821 Reexamination, Ex. 6, at 5; <i>id.</i> Ex. 14, at 6; <i>id.</i> Ex. 16, at 3</li> <li>• Ex. 5, '219 claims 19, 20</li> </ul>

Claims 1–4 <sup>1</sup>	Claim 9	Term/Phrase for Construction	Proposed Construction	Support
	selection criteria,			
(f) determining available alternatives represented in the first subfamily,  (j) determining available alternatives represented in the second subfamily, and	(f) determining available alternatives represented in the first subfamily,  (j) determining available alternatives represented in the second subfamily, and	11. “determining available alternatives”  claims 1 and 9	“identifying those alternatives that remain available for further selection”	<ul style="list-style-type: none"> <li>• Ex. 21, Joint Claim Construction and Prehearing Statement in <i>PartsRiver, Inc. v. Shopzilla, Inc.; Yahoo! Inc.; Pricegrabber.com, Inc.; eBay Inc.; and Microsoft Corporation</i>, No. 07-440 (E.D. Tex. Dec. 15, 2008) [Docket No. 141]</li> <li>• Ex. 2, ’821 patent at 3:43–:45, 8:6–:19, 16:17–16:49</li> <li>• ’821 Reexamination, Ex. 4, at 4; <i>id.</i> Ex. 6, at 4; <i>id.</i> Ex. 14, at 7</li> </ul>
(g) revising said feature screen to indicate the available alternatives of the first subfamily,  (k) revising said feature screen to indicate the available alternatives of the second subfamily.	(g) revising <u>said data for</u> said feature screen to indicate the available alternatives of the first subfamily <u>and outputting said revised data for said feature screen to said client computer via said computer network</u> ,	12. “revising said feature screen to indicate the available alternatives of the [first/second] subfamily”  claim 1	“revising <sup>[2]</sup> the feature screen on the display device of the user’s computer to show all the available alternatives of the [first/second] subfamily”	<ul style="list-style-type: none"> <li>• Ex. 2, ’821 claims 1, 4, 9</li> <li>• Ex. 2, ’821 patent at Abstract, 3:43–:45, 3:50–4:2, 4:24–35, 5:6–16, 7:12–:37, 8:20–:46, 8:51–9:9, 18:50–19:11, Figs. 7, 8, 9, 26, 27, 28, 29</li> <li>• Ex. 6, ’444 claims 1, 14, 29, and 30</li> <li>• Ex. 5, ’219 claims 1, 2, 3, 19 and 20</li> <li>• ’821 Reexamination, Ex. 4, at 3–5; <i>id.</i> Ex. 6, at 2–4; <i>id.</i> Ex. 14, at 7–8</li> <li>• ’444 Prosecution, No. 2, at 3–4; <i>id.</i> No. 4, at 11–12, 17–18; <i>id.</i> No. 8, Kimbrough Affidavit at 1–2 &amp; Ex. C,</li> </ul>

<sup>2</sup> In the Joint Claim Construction Statement, Defendants proposed the word “changing” rather than the word “revising,” *see* Ex. 22, Appx. B, at 5, 7 but to focus the dispute on the key issue — which is who performs this step — Defendants are willing to use the word “revising” in the proposed construction, as Kelora appears to prefer.

Claims 1–4 <sup>1</sup>	Claim 9	Term/Phrase for Construction	Proposed Construction	Support
	(k) revising <u>said data for</u> said feature screen to indicate the available alternatives of the second subfamily <u>and outputting said revised data for said feature screen to said client computer via said computer network</u> .			<p>Danish Affidavit at 2–3 &amp; Ex. C.</p> <ul style="list-style-type: none"> <li>• '821 Reexamination, Ex. 1, Granacki, <i>A Component Library Management System and Browser</i>, § 1.3</li> <li>• Ex. 8, U.S. Patent No. 4,905,094 to Pocock et al. at 2:22–:32, 5:28–:39, Figs. 2A–2B</li> <li>• Ex. 11, Danish Dep. at 274:11–:19, 278:23–279:4, 290:2–:5, 294:17–:23 (Jan. 21, 2009)</li> <li>• Chandler Decl. Exs. Q &amp; R, the AMP Navigator “demonstration program” described in PartsRiver’s responses to Interrogatories Nos. 1 and 2 and produced at Bates number PA-NAT-000001</li> <li>• Ex. 26, Order Granting Defendants’ Motion for Summary Judgment, at 11:9–12:6 (Aug. 21, 2009) [Docket No. 234 in Case No. 09-811]</li> <li>• Chandler Decl., the declaration of Theodore W. Chandler and all cited and attached exhibits (May 28, 2009)</li> </ul>
		13. “revising said data for said feature screen to indicate the	“revising <sup>[3]</sup> the data used by the client computer to display	<ul style="list-style-type: none"> <li>• Ex. 2, '821 claims 1, 9</li> <li>• Ex. 2, '821 patent at 18:49–19:12, Fig. 25</li> </ul>

<sup>3</sup> See *supra* note 2.

Claims 1–4 <sup>1</sup>	Claim 9	Term/Phrase for Construction	Proposed Construction	Support
		available alternatives of the [first/second] subfamily”  claim 9	the feature screen to provide all the available alternatives of the [first/second] subfamily”	<ul style="list-style-type: none"> <li>• Ex. 5, '219 claims 1, 2, 3</li> <li>• '821 Reexamination, Ex. 8, at 3, 5–6; <i>id.</i> Ex. 15 at KS0000452, KS0000454–55</li> </ul>
(h) accepting a second selection criteria <del>comprising</del> <u>from the client computer via said computer network at said server wherein the second selection criteria comprises a resubmission to the server of the</u> alternative or alternatives of the first selection criteria plus at least one alternative selected from the revised feature screen,	(h) <del>receiving and</del> accepting a second selection criteria <del>comprising</del> <u>from said client computer via said computer network, in which said second selection criteria comprises (1) a resubmission by said client computer of the alternative or</u> alternatives of the first selection criteria <del>plus along with (2)</del> at least one alternative selected from the revised feature screen,	14. “accepting a second selection criteria”  original claim 1	“an action performed by the user on the client computer to initiate a search using the alternative(s) selected from the feature screen (e.g., when the user clicks on the “Search” button)”	<ul style="list-style-type: none"> <li>• Ex. 2, '821 claim 5</li> <li>• Ex. 2, '821 patent at 7:38–:49, 8:1–:9, 8:51–:61, 15:64–:67, 18:64–19:2, Fig. 7</li> <li>• Ex. 5, '219 claims 1, 2, 3, 19, 20</li> <li>• Ex. 6, '444 claims 1, 14, 29, 30</li> <li>• '821 Prosecution, No. 3, at 3; <i>id.</i> No. 5</li> <li>• '821 Reexamination, Ex. 4, at 3–5; <i>id.</i> Ex. 6, at 2–4, 9; <i>id.</i> Ex. 14, at 6–7</li> <li>• '444 Prosecution, No. 2, at 3–4; <i>id.</i> No. 4, at 11–12, 17–18; <i>id.</i> No. 8, Kimbrough Aff. at 1–2 &amp; Ex. C; <i>id.</i> No. 8, Danish Aff. at 2–3 &amp; Ex. C.</li> <li>• '821 Reexamination, Ex. 1, Granacki, <i>A Component Library Management System and Browser</i>, § 1.3</li> <li>• Ex. 10, U.S. Patent No. 5,544,360 to Lewak at 8:61–9:4, 10:41–47</li> <li>• Ex. 8, U.S. Patent No. 4,905,094 to Pocock et al. at 2:22–32, 5:25–39 &amp; Fig. 2A block 11</li> <li>• Ex. 25, transcript of the hearing on Defendants’ motion for summary judgment, at 4:4, 8:20–23 (July 16, 2009)</li> </ul>

Claims 1–4 <sup>1</sup>	Claim 9	Term/Phrase for Construction	Proposed Construction	Support
				<ul style="list-style-type: none"> <li>• Chandler Decl. Exs. Q &amp; R, the AMP Navigator “demonstration program” described in PartsRiver’s responses to Interrogatories Nos. 1 and 2 and produced at Bates number PA-NAT-000001</li> <li>• Ex. 26, Order Granting Defendants’ Motion for Summary Judgment, at 11:9–12:6 (Aug. 21, 2009) [Docket No. 234 in Case No. 09-811]</li> <li>• Chandler Decl., the declaration of Theodore W. Chandler and all cited and attached exhibits (May 28, 2009)</li> </ul>
		15. “accepting a second selection criteria”  amended claims 1 and 9	<p>All Defendants: an action performed by the server</p> <p>Cabela’s, Circuit City, and Nebraska Furniture Mart: “utilizing the alternative(s) selected from the feature screen to perform a search”</p>	<ul style="list-style-type: none"> <li>• ’821 Reexamination, Ex. 8, at 13–14, 18; <i>id.</i> Ex. 15; <i>id.</i> Ex. 16, at 3</li> <li>• Ex. 39, transcript of hearing on eBay and Microsoft’s motion for summary judgment, at 21:3–:5 (May 10, 2011)</li> <li>• Ex. 37, Kelora’s opposition to summary judgment, at 19:8–:10 (Apr. 14, 2011)</li> </ul>
		16. “resubmission to the server”  claim 1	“resubmission by said client computer to the server”	<ul style="list-style-type: none"> <li>• Ex. 2, ’821 claims 1, 9</li> <li>• Ex. 2, ’821 patent at 8:51–:66, 18:63–19:12, Fig. 25</li> <li>• ’821 Reexamination, Ex. 15; <i>id.</i> Ex. 16, at 3</li> </ul>

Claims 1–4 <sup>1</sup>	Claim 9	Term/Phrase for Construction	Proposed Construction	Support
2. The method of claim 1 wherein each family has at least one feature associated therewith and further comprising the step of:  displaying at least one grouping wherein each said grouping comprises one of said features visually related to respective alternatives.		17. “grouping”  claims 2 and 4	“a combination of one of the features and a plurality of respective alternatives”	<ul style="list-style-type: none"> <li>• Ex. 21, Joint Claim Construction and Prehearing Statement in <i>PartsRiver, Inc. v. Shopzilla, Inc.; Yahoo! Inc.; Pricegrabber.com, Inc.; eBay Inc.; and Microsoft Corporation</i>, No. 07-440 (E.D. Tex. Dec. 15, 2008) [Docket No. 141]</li> <li>• Ex. 2, '821 patent at Abstract, 3:40–:42, 7:11–:22, 7:47–:59</li> <li>• '821 Reexamination, Ex. 4, at 6; <i>id.</i> Ex. 6, at 5 ; <i>id.</i> Ex. 14, at 8–9</li> <li>• '444 Prosecution, No. 2, at 4</li> </ul>
		18. “features visually related to respective alternatives”  claim 2	“features shown together with alternatives on the display device of the user’s computer”	<ul style="list-style-type: none"> <li>• Ex. 21, Joint Claim Construction and Prehearing Statement in <i>PartsRiver, Inc. v. Shopzilla, Inc.; Yahoo! Inc.; Pricegrabber.com, Inc.; eBay Inc.; and Microsoft Corporation</i>, No. 07-440 (E.D. Tex. Dec. 15, 2008) [Docket No. 141]</li> <li>• Ex. 2, '821 patent at 3:40–:43, 7:11–:20, 8:20–:27, Fig. 7, Fig. 8</li> </ul>
3. The method according to claim 2 and further comprising the step of:  providing an interactive pointer and displaying information				

Claims 1–4 <sup>1</sup>	Claim 9	Term/Phrase for Construction	Proposed Construction	Support
specific to one of said features upon a user initiated signal when said pointer is pointing to a feature caption on said feature screen.				
4. The method according to claim 2 wherein at least one said groupings is hidden from view if all said respective alternatives are not available.				

# **Exhibit 2**





US006275821B1

(12) **United States Patent**  
**Danish et al.**

(10) **Patent No.:** **US 6,275,821 B1**  
(45) **Date of Patent:** **Aug. 14, 2001**

(54) **METHOD AND SYSTEM FOR EXECUTING A GUIDED PARAMETRIC SEARCH**

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(73) Assignee: **Saqqara Systems, Inc.**, San Jose, CA (US)

(\*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **09/384,303**

(22) Filed: **Aug. 26, 1999**

#### Related U.S. Application Data

(63) Continuation of application No. 08/943,573, filed on Oct. 3, 1997, now Pat. No. 5,983,219, which is a continuation of application No. 08/323,186, filed on Oct. 14, 1994, now Pat. No. 5,715,444.

(51) **Int. Cl.**<sup>7</sup> ..... **G06F 17/30**

(52) **U.S. Cl.** ..... **707/3; 345/338**

(58) **Field of Search** ..... **707/1, 2, 3, 4; 345/338**

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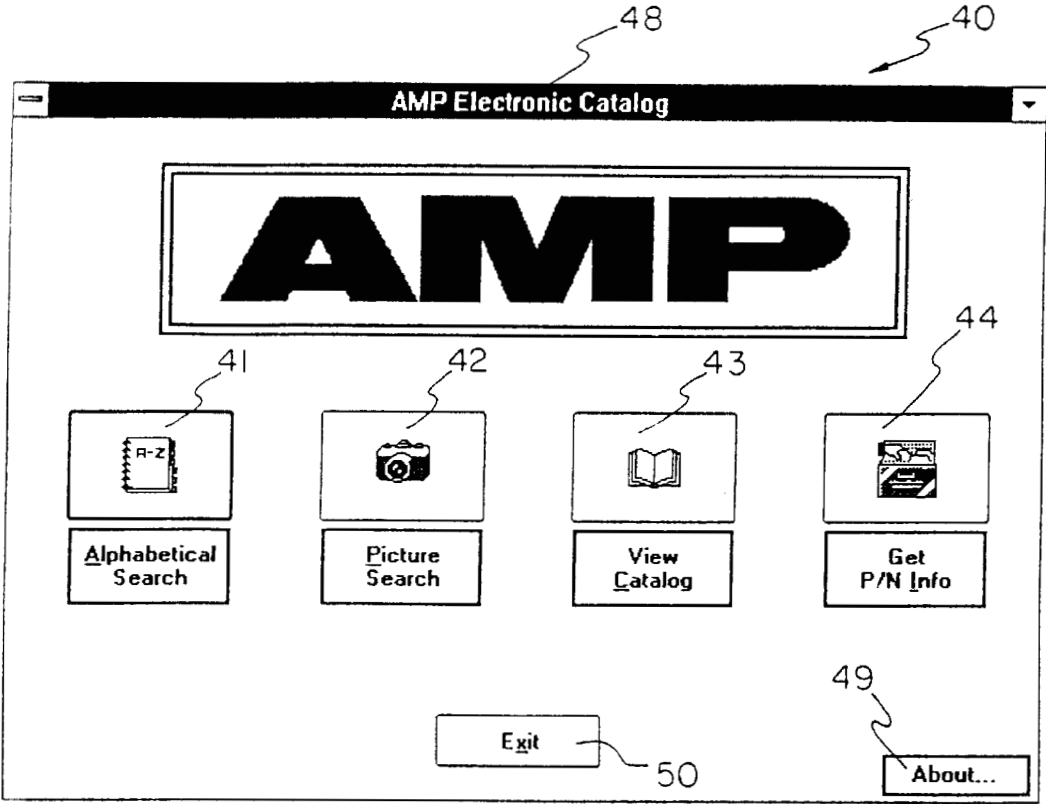
*Primary Examiner*—Jack Choules

(74) *Attorney, Agent, or Firm*—Gibson, Dunn & Crutcher L

(57) **ABSTRACT**

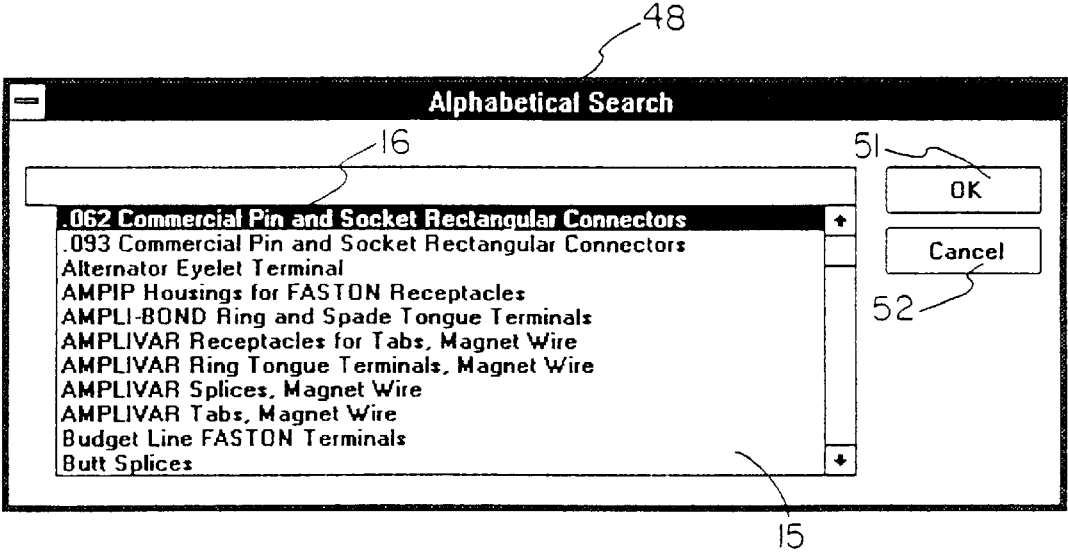
A process for identifying a single item from a family of items presents a user with a feature screen having a series of groupings. Each grouping represents a feature having a set of alternatives from which to select. Selected alternatives are used as a selection criteria in a search operation. Results of the search operation is a revised feature screen indicating alternatives that remain available to the user for further selection and searching. The feature screen and search process, therefore, presents the user with a guided nonhierarchical parametric search to identify matching items based upon user specified criteria and priorities. Also disclosed is an adaptation of the claimed method and system appropriate in an Internet environment.

**8 Claims, 30 Drawing Sheets**



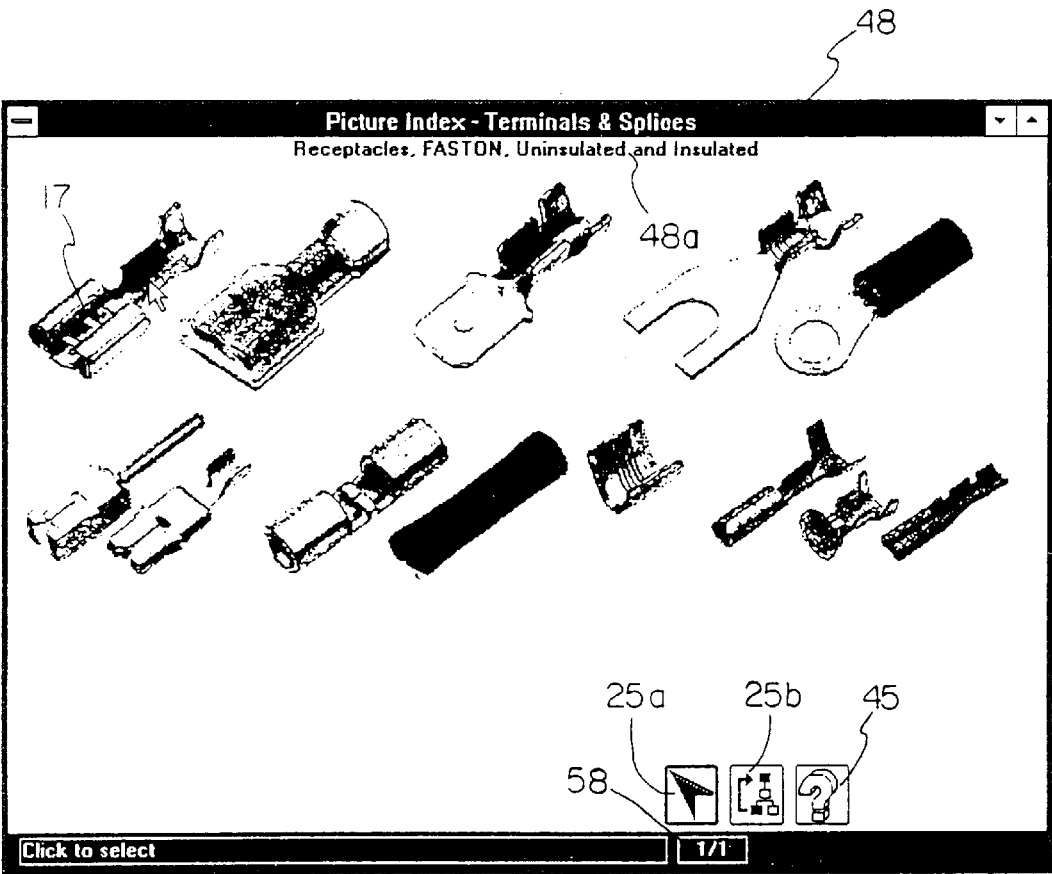
MAIN MENU

Fig. 1



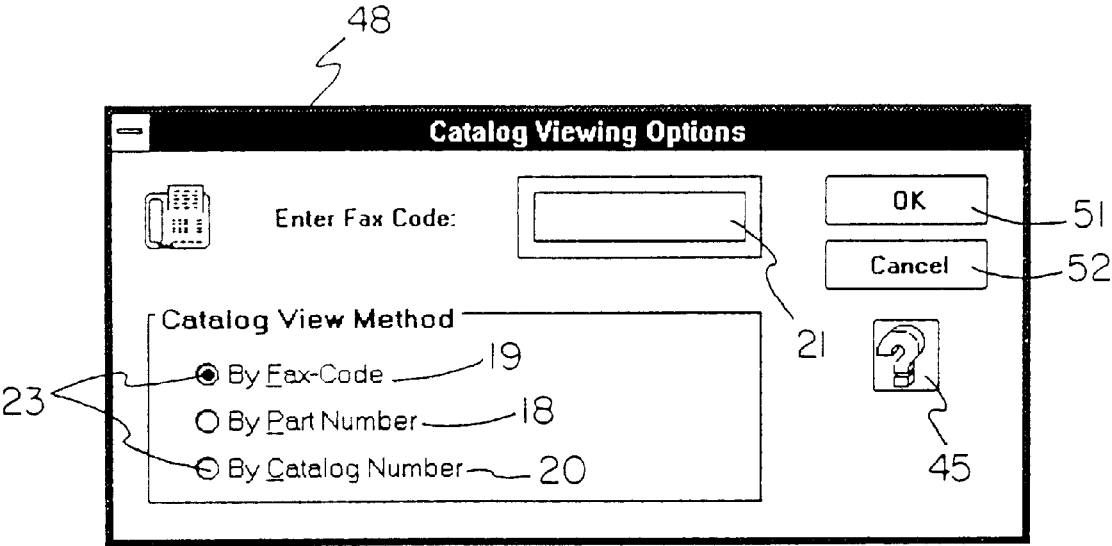
ALPHABETICAL SEARCH

Fig. 2



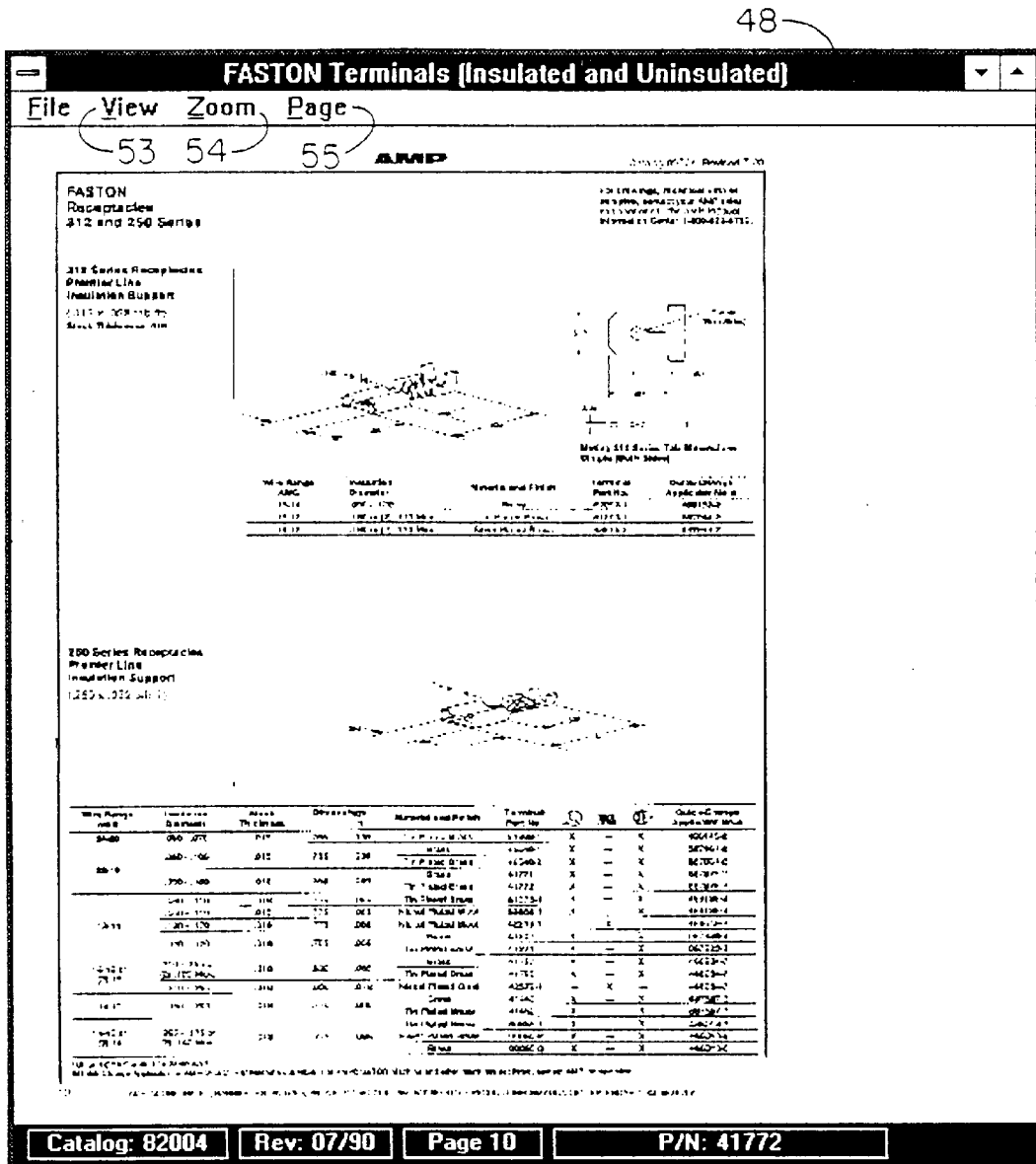
PICTURE SEARCH AND  
SECOND LEVEL PICTURE SEARCH

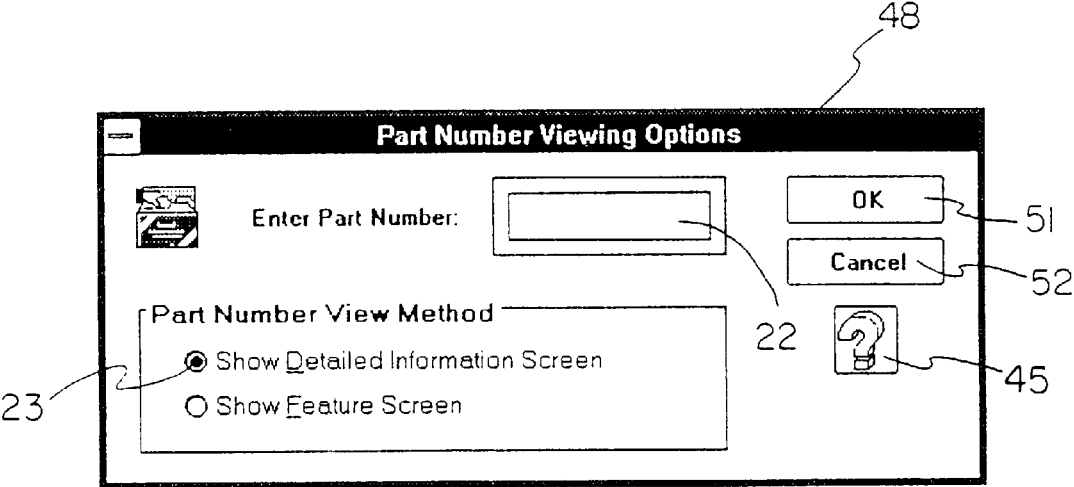
Fig. 3



VIEW CATALOG PAGE

Fig. 4





VIEW PART NUMBER INFORMATION

Fig. 6

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9

48

**FASTON Receptacles - Uninsulated**

Matching Qty:  47 P/N:  46

202 203 204 205 206 207 208

24 201 13

**Specials**

☐ None 35

☐ For Posted Hermetic Tabs

☐ Receptacle/Tab Combination

**Tab Fit**

.110 x .016

.110 x .020

.110 x .025

**Receptacle Style**

☐ Straight

☐ Flag

☐ Reversible Flag

**Insulation Support**

☐ Insulation Support

☐ Non-Insulation Support

**Wire Type**

☐ Regular Wire

☐ Magnet Wire

**Wire Range**

12-10

12-10/(2)12/(2)14

12-10/(2)14

**Insulation Dia.**

.030-.070

.040-.060

.040-.070

**Insertion Force**

☐ Normal

☐ Low

**Material**

☐ Brass

☐ Phosphor-Bronze

☐ Steel

16

15

13

23

57

13 5 6 36

**Finish**

☐ None

☐ Tin

☐ Pre Tin

☐ Silver

☐ Nickel

**Line**

☐ Premier

☐ Budget

☐ Economy

☐ Commercial

☐ Moldable

**Crimp Type**

☐ "F"

☐ Tab-Lok

1600

102

17

Fig. 7

48

FASTON Receptacles - Uninsulated

Matching Qty: 5 P/N:

17

Specials

- ☒ None
- ☐ For Posted Hermetic Tabs
- ☐ Receptacle/Tab Combination

Tab Fit

.250 x .020  
.250 x .032

15

Receptacle Style

- ☒ Straight
- ☐ Flag
- ☐ Reversible Flag

Insulation Support

- ☒ Insulation Support
- ☐ Non-Insulation Support

34

Wire Type

- ☐ Regular Wire
- ☒ Magnet Wire

14

Wire Range

18-14  
18-14/(2)17  
20-16/(2)20/23

37

Insulation Dia.

.050-.080  
.100-.140/(2).060 MAX  
.120-.170

5

Insertion Force

- ☐ Normal
- ☐ Low

Material

- ☒ Brass
- ☐ Phosphor-Bronze
- ☐ Steel

Finish

- ☐ None
- ☐ Tin
- ☐ Pre Tin
- ☐ Silver
- ☐ Nickel

7

8

Crimp Type

- ☒ "F"
- ☐ Tab-Lok

13

6

1600

Fig. 8



FASTON Receptacles - Uninsulated									
Matching Qty: <input type="text" value="1"/>		P/N: <input type="text" value="60384-1"/>		3					
209									
<b>Specials</b> <input checked="" type="radio"/> None <input type="radio"/> For Posted Hermetic Tabs <input type="radio"/> Receptacle/Tab Combination		<b>Tab Fit</b> <input type="text" value="250 x .032"/>		<b>Receptacle Style</b> <input checked="" type="radio"/> Straight 7 <input type="radio"/> Flag 8 <input type="radio"/> Reversible Flag		<b>Insulation Support</b> <input checked="" type="radio"/> Insulation Support 7 <input type="radio"/> Non-Insulation Support 8			
<b>Wire Type</b> <input type="radio"/> Regular Wire <input checked="" type="radio"/> Magnet Wire 14		<b>Wire Range</b> <input type="text" value="20-16/(2)20/23"/>		<b>Insulation Dia.</b> <input type="text" value=".100-.140/(2).060 MAX"/>		<b>Insertion Force</b> <input checked="" type="radio"/> Normal <input type="radio"/> Low		<b>Material</b> <input checked="" type="radio"/> Brass <input type="radio"/> Phosphor-Bronze <input type="radio"/> Steel	
<b>Finish</b> <input checked="" type="radio"/> None 37 <input type="radio"/> Tin <input type="radio"/> Pre Tin <input type="radio"/> Silver <input type="radio"/> Nickel		<b>Crimp Type</b> <input checked="" type="radio"/> "F" <input type="radio"/> Tab-Lok							
<div>1600</div>									

Fig. 9

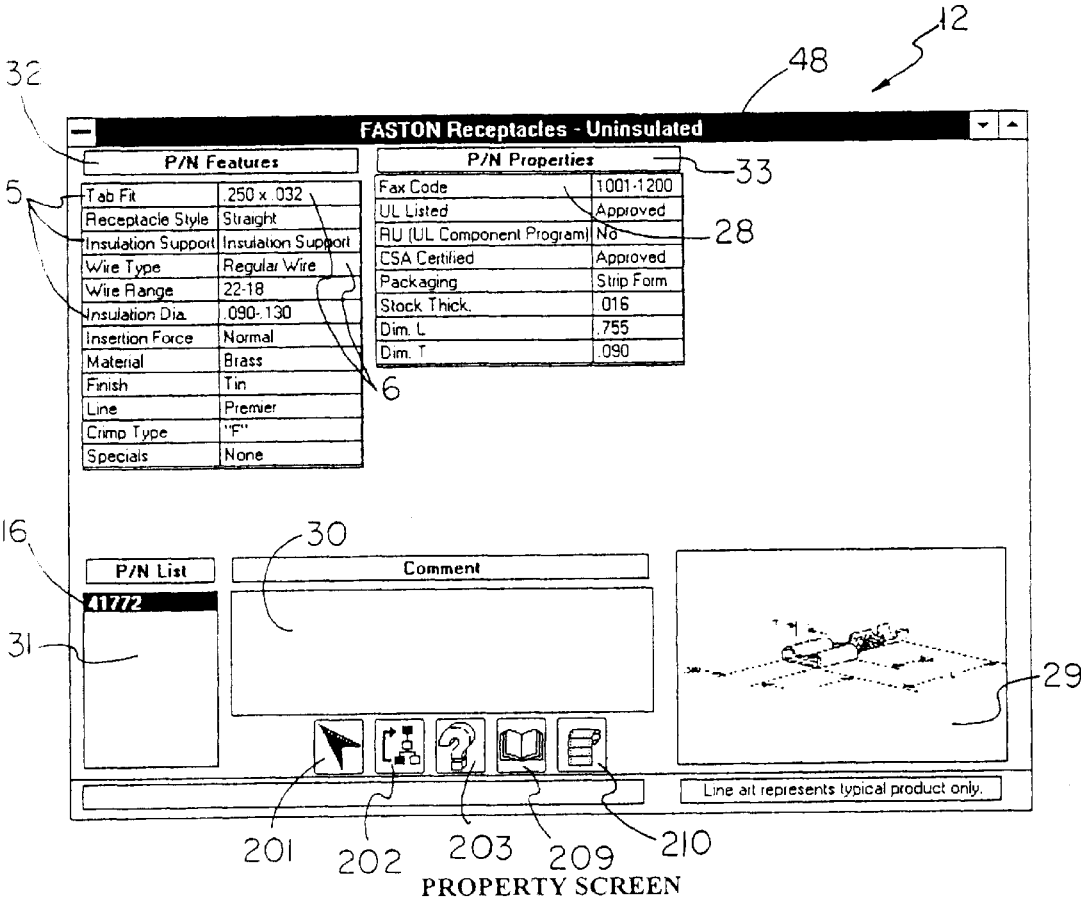


Fig. 10

60

601 SCREEN TYPE	602 SCREEN	603 FEA. 1	FEA. 2	FEA. 3	FEA. 4	FEA. 5	FEA. 6	FEA. 7	FEA. 8	...	FEA. 15
F	1600	50	38	32	31	34	40	41	42		
P	1600	1001	1002	1003	1004	101	7	43	49		
F	1200	32	30	4	7	14	100				

Fig. 11

62

621 FEATURE SCREEN	622 GROUPING SEQUENCE	623 SELECTION TYPE	624 FEATURE
1575	1	R	57
1575	2	R	58
1575	3	L	69

Fig. 13

63

631 SCREEN	632 FEATURE	633 ALTERNATIVE SEQUENCE	634 ALTERNATIVE
1101	100	1	11
1101	100	2	7
1101	11	1	1
1101	11	2	2
1101	11	3	3

Fig. 14

61										
611	612	613		ALT 3	ALT 4	ALT 5	ALT 6	613		614
SCREEN	ITEM	ALT 1	ALT 2	ALT 3	ALT 4	ALT 5	ALT 6	...	ALT 15	LOCATE
1600	63225-2	1	3	1	1	1	6			016000000100003000 01000010000100006
1600	62092-1	1	3	1	1	1	9			016000000100003000 01000010000100009
1600	61400-1	10	3	1		1	14			0160000001000003000 01000000000100014
1600	61408-1	10	3	1		1	14			0160000001000003000 01000000000100014
⋮										⋮
1600										
1601										
1601										

Fig. 12

641

642

FEATURE	NAME
1	Material
2	Number of Positions
43	Stock Thickness
50	Tab Fit
57	Barrel Type
68	Wire Gauge
100	Color
1002	UL Listed

64

Fig. 15

691

692

693

SCREEN TYPE	SCREEN	TITLE
Menu	100	FASTON Terminals
Feature	1005	FASTON Tabs
Feature	1575	FASTON Receptacles

69

Fig. 20

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651 652 653 65

FEATURE	ALTERNATIVE	NAME
57	1	Open Barrel
57	3	Closed Barrel (PIDG)
68	18	18 AWG
100	1	Red
100	2	Blue
100	3	Green
100	4	Black
50	1	.312 x .032
50	2	.250 x .032
50	10	.110 x .020
50	11	.110 x .016
43	1	.010
43	2	.012
43	6	.016

Fig. 16

661 662 66

SCREEN	IMAGE FILE NAME
1101	POSLOK
1151	FASTIN
1200	AMPIP

Fig. 17

671 SCREEN	672 ITEM	673 ALT 1	673 ALT 2	ALT 3	ALT 4	ALT 5	ALT 6	ALT 7	ALT 8	...	673 ALT 15
1600	63225-2	1						6			
1600	62092-1	1						6			
1600	61400-1	25	1	2	1	3		1	315		
1600	61408-1	25	1	2	1	3		1	315		

67

Fig. 18

681 ITEM	682 COMMENT	683 IMAGE
62813-2	Left handed flag	FAST_11D
62814-1	Right handed flag	FAST_11D
61202-1	UL Listed and CSA Certified for 22 AWG	FAST_13A

68

Fig. 19

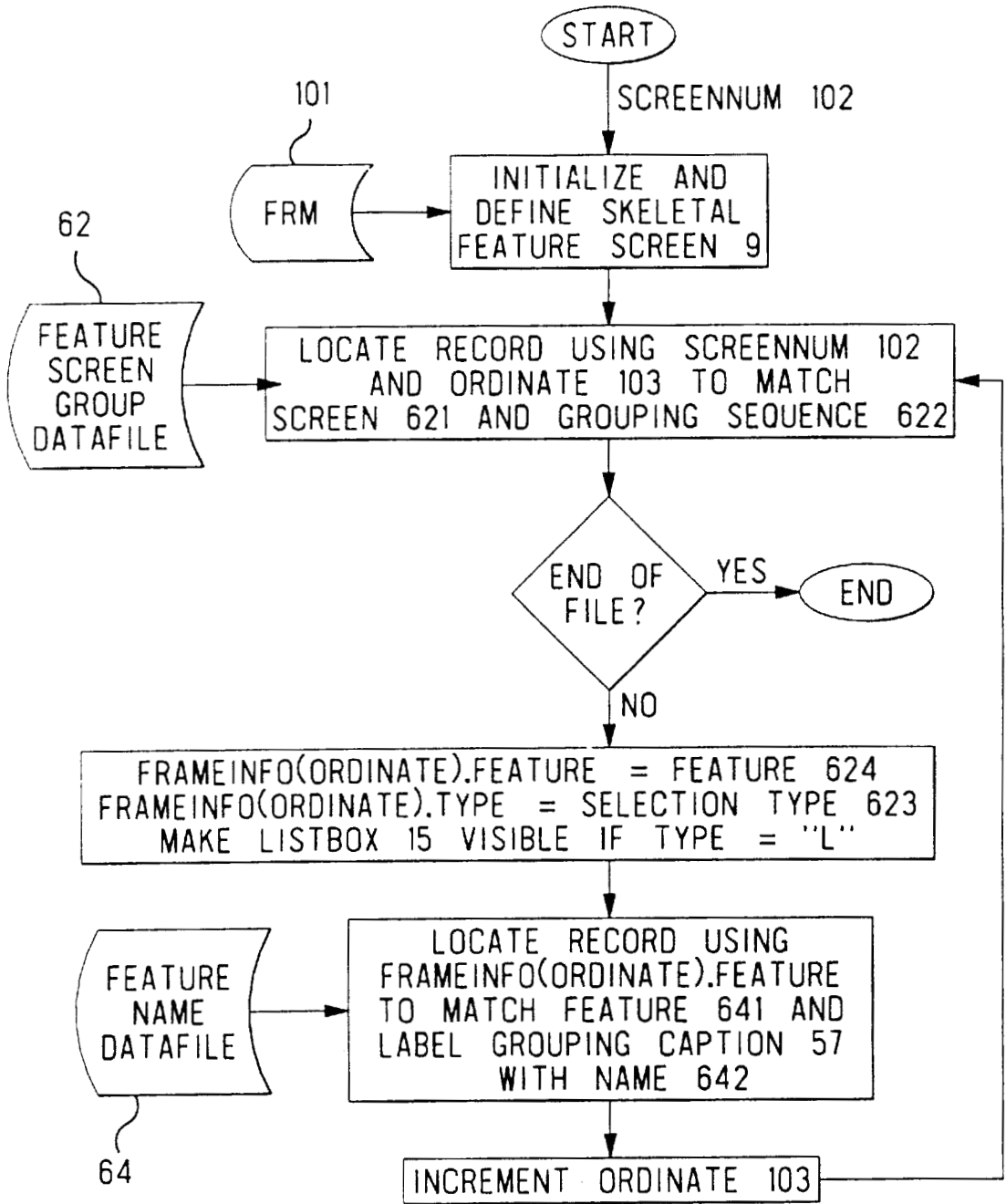


Fig. 21

Fig. 22

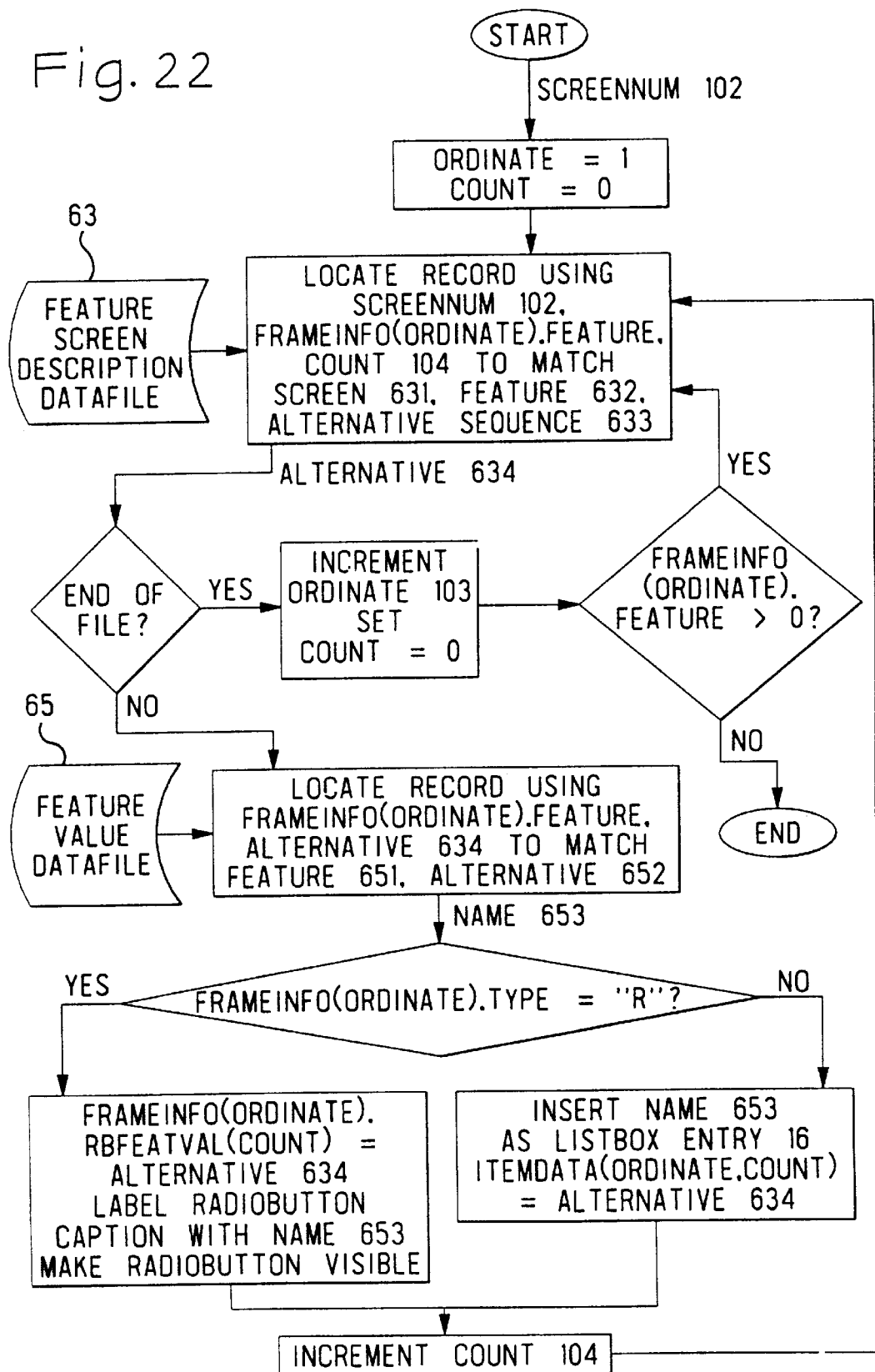
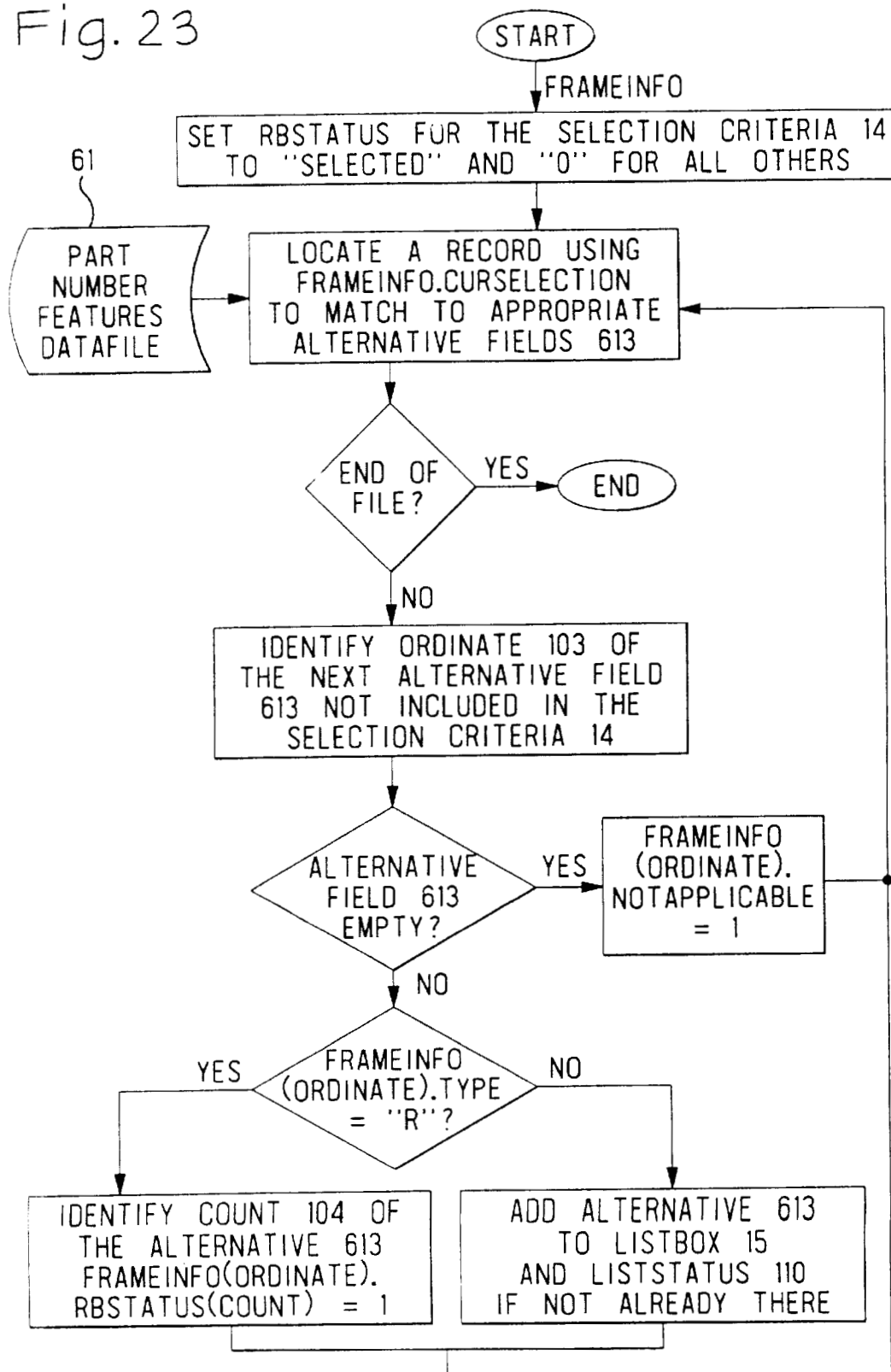


Fig. 23



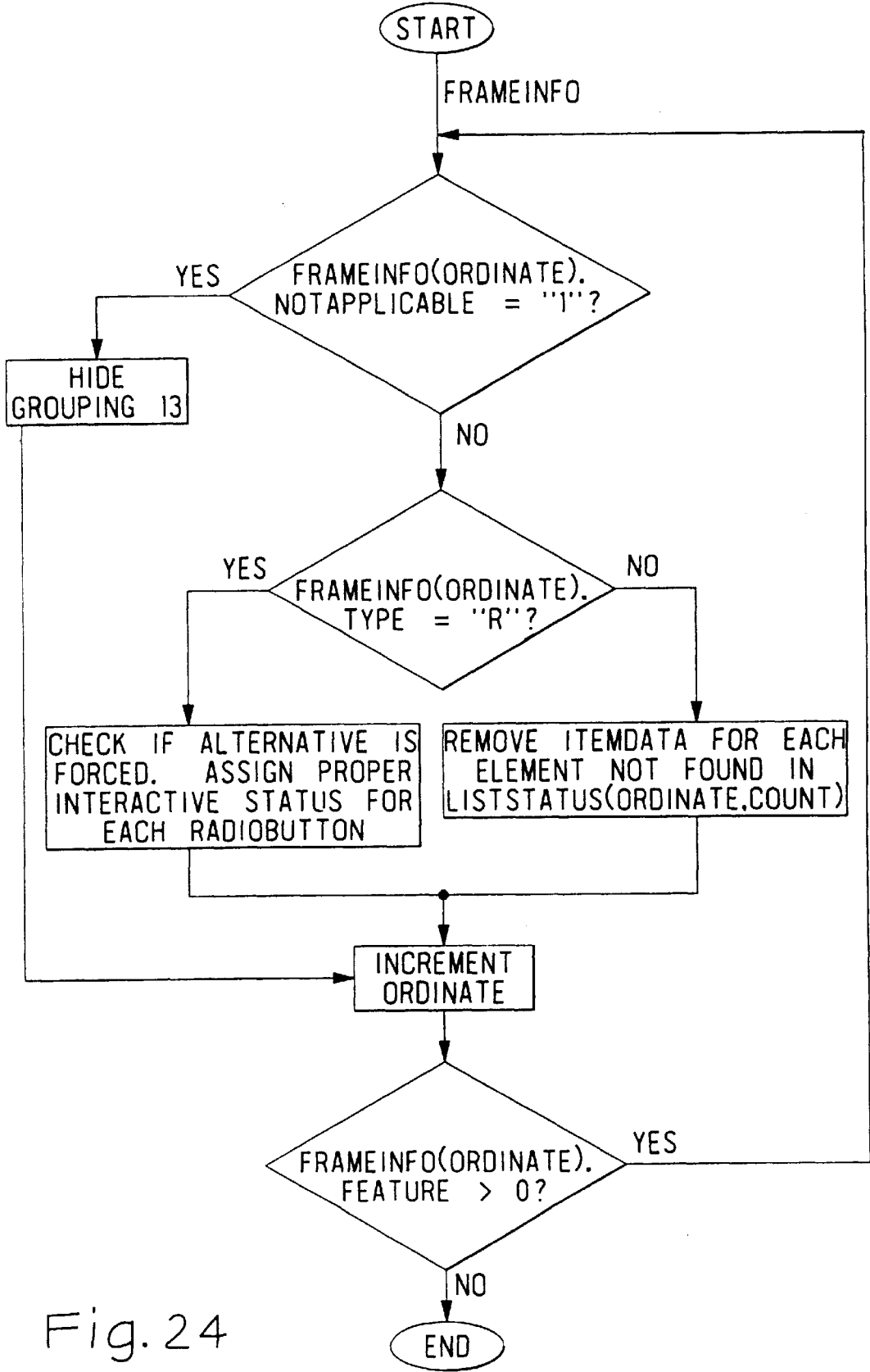


Fig. 24

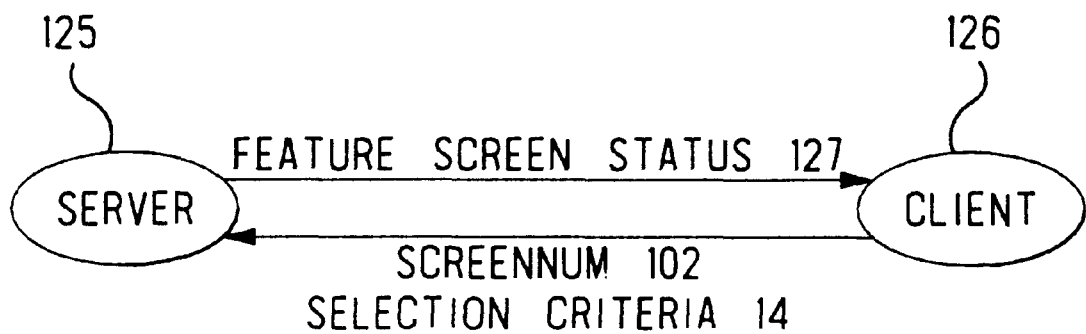


Fig. 25

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## FASTON Receptacles - Uninsulated

201

[Go to Main Menu](#) | [View Family Picture](#) 211

---

☐ **Specials:** None | For Posted Hermetic Tabs | Receptacle/Tab Combination

☐ **Tab Fit:** .110 x .016 | .110 x .020 | .110 x .025 | .110 x .032 | .187 x .015 | .187 x .017 | .187 x .020 | .187 x .032 | .205 x .020 | .205 x .032 | .250 x .020 | .250 x .032 | .312 x .032

☐ **Receptacle Style:** Straight | Flag | Reversible Flag

☐ **Insulation Support:** Insulation Support | Non-Insulation Support

☐ **Wire Type:** Regular Wire | Magnet Wire

☐ **Wire Range:** 12-10 | 12-10/(2)12/(2)14 | 12-10/(2)14 | 14-10 | 14-10/(2)14 | 16-12 | 16-12/(2)18 | 18-12 | 18-14 | 18-14/(2)16 | 18-14/(2)17 | 18-16 | 18-16/(2)18 | 20-14 | 20-16 | 20-16/(2)20 | 20-16/(2)20/23 | 20-18/(2)20 | 22-16 | 22-18 | 22-20 | 24-19 | 24-20 | 24-22 | 26-22

☐ **Insertion Force:** Normal | Low 5

☐ **Material:** Brass | Phosphor-Bronze | Steel 6

☐ **Finish:** None | Tin | Pre Tin | Silver | Nickel

☐ **Crimp Type:** "F" | Tab-Lok

---

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Fig. 26

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201

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**FASTON Receptacles - Uninsulated** 207

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**Number of Matching P/Ns: 34** 47 206

---

☐ **Specials:** [None] | For Posted Hermetic Tabs | Receptacle/Tab Combination

☐ **Tab Fit:** .110 x .016 | .110 x .020 | .110 x .025 | .110 x .032 | .187 x .015 | .187 x .017 | .187 x .020 | .187 x .032 | .205 x .020 | .205 x .032 | .250 x .020 | .250 x .032 | .312 x .032

☐ **Receptacle Style:** Straight | Flag | Reversible Flag 37

☐ **Insulation Support:** Insulation Support | [Non-Insulation Support]

☐ **Wire Type:** [Regular Wire] | Magnet Wire 34

☐ **Wire Range:** 12-10 | 12-10/(2)12/(2)14 | 12-10/(2)14 | 14-10 | 14-10/(2)14 | 16-12 | 16-12/(2)18 | 18-12 | 18-14 | 18-14/(2)16 | 18-14/(2)17 | 18-16 | 18-16/(2)18 | 20-14 | 20-16 | 20-16/(2)20 | 20-16/(2)20/23 | 20-18/(2)20 | 22-16 | 22-18 | 22-20 | 24-19 | 24-20 | 24-22 | 26-22

☐ **Insertion Force:** [Normal] | Low

☐ **Material:** Brass | Phosphor-Bronze | Steel

☐ **Finish:** None | Tin | Pre Tin | Silver | Nickel 8

☐ **Crimp Type:** "F" | Tab-Lok 7

Fig. 27

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## FASTON Receptacles - Uninsulated

[Go to Main Menu](#) | [View Family Picture](#) | [Reset Selections](#) | [View Details](#)

**Number of Matching P/Ns: 13** | 4

---

☐ **Specials:** [None] | For Posted Hermetic Tabs | Receptacle/Tab Combination

☐ **Tab Fit:** .110 x .016 | .110 x .020 | .110 x .025 | .110 x .032 | .187 x .015 | .187 x .017 | .187 x .020 | .187 x .032 | .205 x .020 | .205 x .032 | .250 x .020 | .250 x .032 | .312 x .032

☐ **Receptacle Style:** Straight | Flag | Reversible Flag | 4

☐ **Insulation Support:** Insulation Support | [Non-Insulation Support]

☐ **Wire Type:** [Regular Wire] | Magnet Wire

☐ **Wire Range:** 12-10 | 12-10/(2)12/(2)14 | 12-10/(2)14 | 14-10 | 14-10/(2)14 | 16-12 | 16-12/(2)18 | 18-12 | 18-14 | 18-14/(2)16 | 18-14/(2)17 | 18-16 | 18-16/(2)18 | 20-14 | 20-16 | 20-16/(2)20 | 20-16/(2)20/23 | 20-18/(2)20 | 22-16 | 22-18 | 22-20 | 24-19 | 24-20 | 24-22 | 26-22

☐ **Insertion Force:** [Normal] | Low

☐ **Material:** Brass | Phosphor-Bronze | Steel

☐ **Finish:** None | Tin | Pre Tin | Silver | Nickel

☐ **Line:** Premier | Budget | Economy | Commercial | Moldable

☐ **Crimp Type:** "F" | Tab-Lok

8

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Fig. 28

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## FASTON Receptacles - Uninsulated

[Go to Main Menu](#) | [View Family Picture](#) | [Reset Selections](#) | [View Details](#)

**Matching P/N(s):** 42845-1 — 46

---

**Specials:** [None] | For Posted Hermetic Tabs | Receptacle/Tab Combination

**Tab Fit:** .110 x .016 | .110 x .020 | .110 x .025 | .110 x .032 | .187 x .015 | .187 x .017 | .187 x .020 | .187 x .032 | .205 x .020 | .205 x .032 | .250 x .020 | .250 x .032 | .312 x .032

**Receptacle Style:** [Straight] | Flag | Reversible Flag

**Insulation Support:** Insulation Support | [Non-Insulation Support]

**Wire Type:** [Regular Wire] | Magnet Wire

**Wire Range:** 12-10 | 12-10/(2)12/(2)14 | 12-10/(2)14 | 14-10 | 14-10/(2)14 | 16-12 | 16-12/(2)18 | 18-12 | [18-14] | 18-14/(2)16 | 18-14/(2)17 | 18-16 | 18-16/(2)18 | 20-14 | 20-16 | 20-16/(2)20 | 20-16/(2)20/23 | 20-18/(2)20 | 22-16 | 22-18 | 22-20 | 24-19 | 24-20 | 24-22 | 26-22

**Insertion Force:** [Normal] | Low

**Material:** [Brass] | Phosphor-Bronze | Steel

**Finish:** [None] | Tin | Pre Tin | Silver | Nickel

**Line:** Premier | Budget | [Economy] | Commercial | Moldable

**Crimp Type:** ["F"] | Tab-Lok

Fig. 29

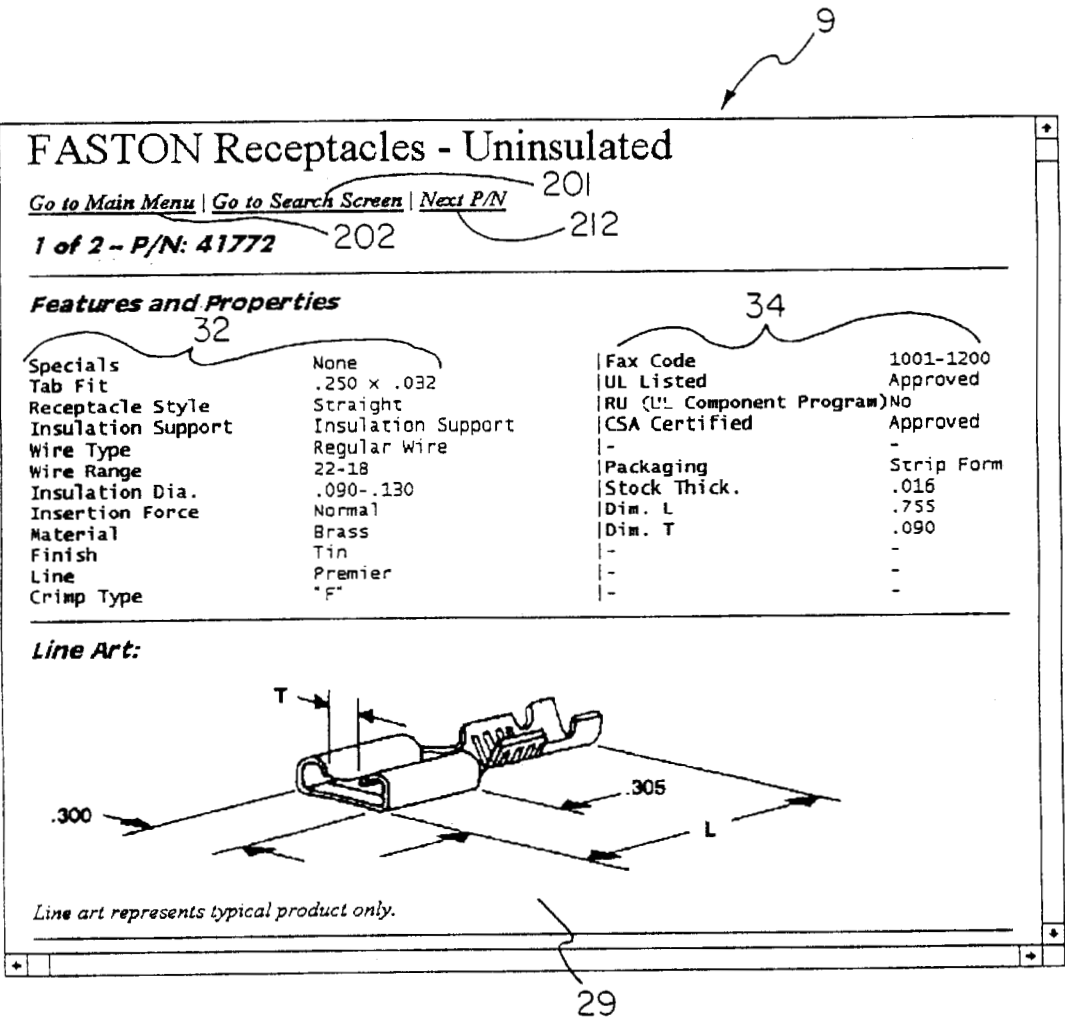


Fig. 30

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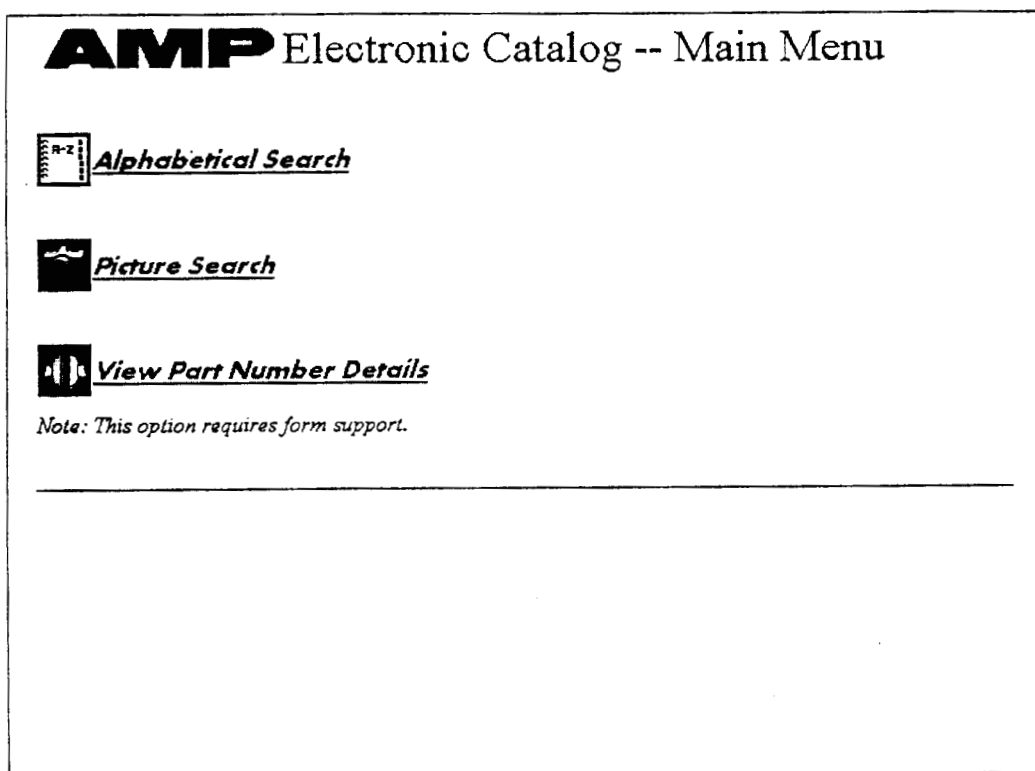


Fig. 31

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<b>AMP</b> Electronic Catalog -- Alphabetical	
Index	
<u><i>Return to Main Menu</i></u>	
<u><i>A / B / C / D / E / F / G / H / K / L / M / P / R / S / T / U / W</i></u>	
<u>062 Commercial Pin and Socket Rectangular Connectors</u>	
<u>093 Commercial Pin and Socket Rectangular Connectors</u>	
<b>A</b>	
<u>Alternator Eyelet Terminal</u>	
<u>AMPIP Housings for FASTON Receptacles</u>	
<u>AMPLI-BOND Ring and Spade Tongue Terminals</u>	
<u>AMPLIVAR Receptacles for Tabs, Magnet Wire</u>	
<u>AMPLIVAR Ring Tongue Terminals, Magnet Wire</u>	
<u>AMPLIVAR Splices, Magnet Wire</u>	
<u>AMPLIVAR Tabs, Magnet Wire</u>	
<b>B</b>	
<u>Budget Line FASTON Terminals</u>	

Fig. 32

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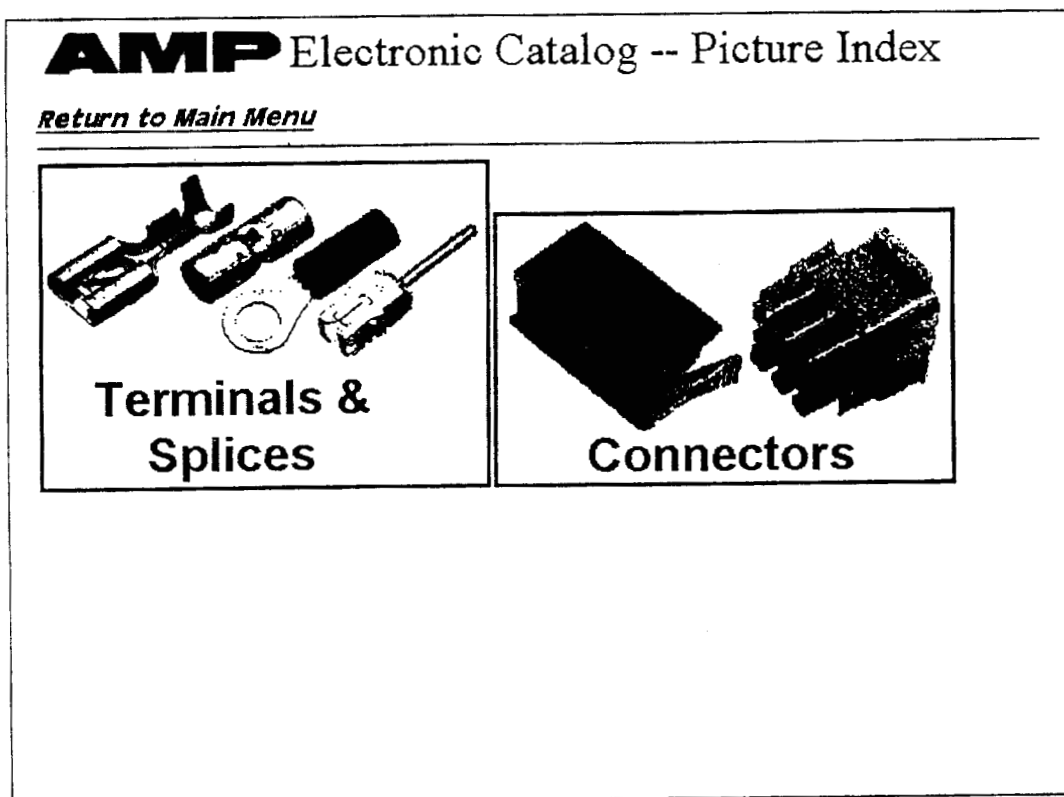


Fig. 33

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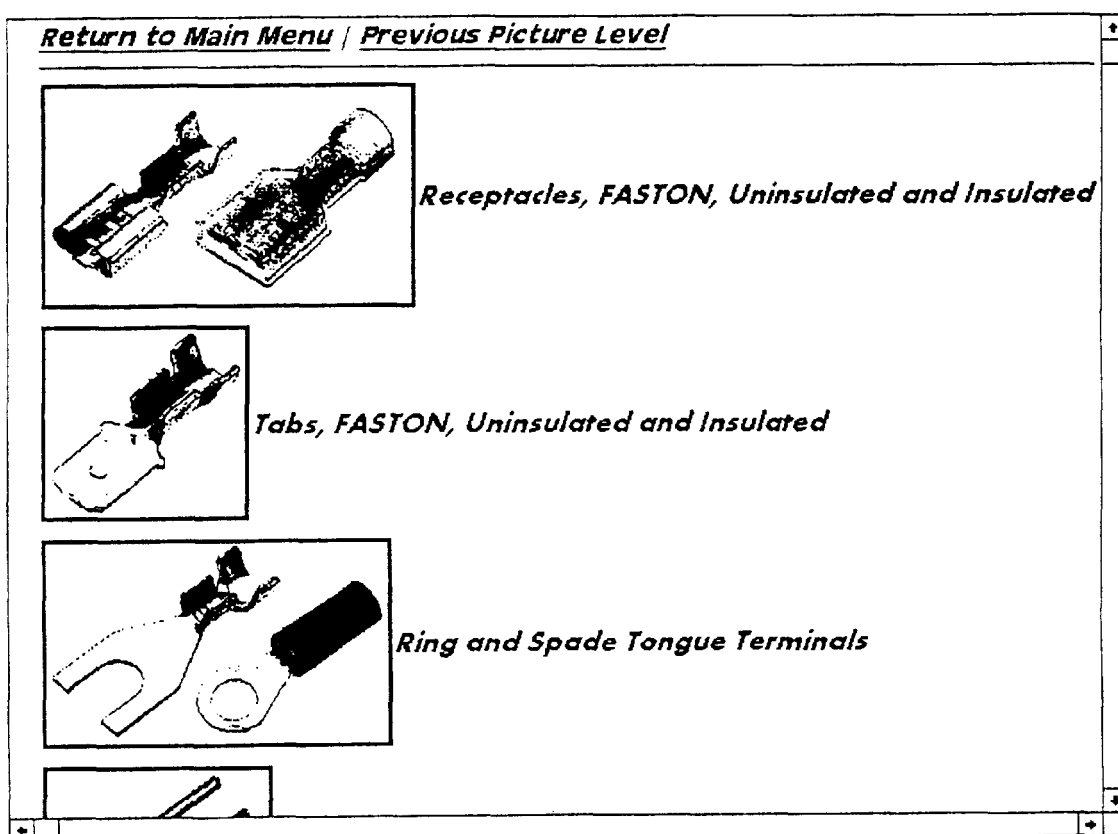


Fig. 34

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**AMP** Electronic Catalog -- View Part  
Number

**Return to Main Menu**

*In the current version you must enter an existing AMP Part Number! Future versions will be enhanced to automatically locate dash numbers from a "base only" part number.*

---

***View Detailed Information About a P/N***

Enter AMP Part Number:

Press this button when complete:

---

Fig. 35

**METHOD AND SYSTEM FOR EXECUTING A  
GUIDED PARAMETRIC SEARCH**

**RELATIONSHIP TO COPENDING  
APPLICATIONS**

This application is a Continuation of application Ser. No. 08/943,573, filed Oct. 3, 1997, issued as U.S. Pat. No. 5,983,219 on Nov. 9, 1999, entitled "Method And System For Executing A Guided Parametric Search", which is a Continuation of Ser. No. 08/323,186, filed Oct. 14, 1994, now U.S. Pat. No. 5,715,444, issued Feb. 3, 1998, entitled "Method And System For Executing A Guided Parametric Search", both of which are incorporated herein by reference in their entirety.

**FIELD OF THE INVENTION**

The present invention relates to navigation systems and more particularly to a process for identifying an item within a family of items.

**BACKGROUND**

Increased memory and remote electronic data storage capacity offers access to large amounts of data in a very convenient form and physical size. Data may be available on diskette, CD-ROM, magnetic tape, and on line to a centrally located computer and memory storage medium. The challenge remains to extract information from the data simply and efficiently and to have confidence in the result that all relevant items have been uncovered. The widespread use of computers and electronic searching has attracted the attention of large manufacturers offering a vast array of products in an increasingly competitive environment. In an effort to offer product that closely matches customer needs, manufacturers proliferate product and product feature alternatives. This proliferation of product offerings provides the customer with more options from which to choose, however, it also increases the difficulty of finding the one product offering that best addresses a specific customer's needs. Manufacturers response have been to offer a series of specialized glossy catalogs and trained sales personnel to aid customers in their product selection effort. To a manufacturer, these catalogs are costly to create, distribute, and update. To a consumer, these catalogs are cumbersome to use and store. In order to further breakdown obstacles between a customer's need to obtain a product and purchase of the right product, a manufacturer may offer what is typically a large catalog or series of catalogs of product offerings, electronically. An electronic catalog offers the convenience of compact physical size coupled with automated search and retrieval.

One known search method of automated search and retrieval employs Boolean logic and keyword searching. The Boolean logic keyword search is appropriate for locating concepts discussed in textbased references. The Boolean search is based on certain words or word relationships contained in a relevant collection of materials. Formulating an accurate and efficient Boolean search requires a certain level of knowledge about the structure of the data, the type of material being searched, the classification of the data if there is one, and any keywords or standard terminology likely to be used to express the concepts being searched. The Boolean logic keyword search is beneficial because it permits a user to formulate a search that accurately reflects certain priorities for the search. The Boolean logic keyword search, however, is inappropriate for locating a particular mix of feature alternatives within a database of product

information. One searching for certain information may not be familiar with the terminology used in selecting a particular product. Multiple products may use different but synonymous terms. A concept expressed by a standard industry term in one industry may be different from a standard industry term in a different industry. A keyword search would require searching on all synonyms used in order to ensure a complete and accurate result.

Other interactive user interfaces use a hierarchial search. Hierarchial searches may also be referred to as tree searches and are a form of guided search. A variation of the hierarchial search is disclosed in U.S. Pat. No. 4,821,211 to Torres. A hierarchial search method offers a list of alternatives from which to select. The first list of alternatives has the highest priority and defines the profile of or relates to the remaining alternatives. Once selected, the system branches to another screen or lower level screen with another list of alternatives. The next list of alternatives having a lower priority. The system branches down through the various menus of alternatives having decreasing priority levels. There are known various methods of presenting graphical representations of a hierarchy to a user to help a user understand the current position within the hierarchy and the options for further movement within the hierarchy. A hierarchial search is appropriate for narrowing down to a subset of items from which to select based on alternatives having a fixed or necessarily depending priority level. Using this method, the available alternatives shown on any screen depend upon prior alternative selections. The hierarchial search is beneficial in that it is guided. A guided search meaning that use of the search does not require knowledge of the terminology used within the database due to the fact that terms for the available concepts are offered to a user. A user then makes a selection before proceeding to the next level. The hierarchial search, however, is cumbersome unless the selection of one alternative obviates the availability of other alternatives. Unless a user knows exactly what he or she wants and with what priority, each "branch" in the tree must be explored in order to gather an understanding of how certain selections affect remaining alternatives. In the case of a list of product offerings, given a set of alternative features for a single product, a number of people will have differing priorities for those alternatives and the priorities will have varying weights. Another disadvantage of the hierarchial search is that the greater the number of alternatives and permutations of alternative selections, the more levels there are from which to select additional alternatives. Multiple levels of screens increase the time and complexity of the search and are not as user-friendly or as intuitive to use as a simpler single screen user interface. The need for a nonhierarchial guided parametric search is based on the principle that given a family of items having certain features associated therewith each feature having respective alternatives, the number of products actually offered by a manufacturer is less than the number of possible permutations of alternatives. For the purposes of a simple illustration, a family of items may be cars in which features include color, number of doors, transmission style, braking style, etc. If a feature of a car is color, respective alternatives may be red, white, and blue. If a feature is transmission styles, respective alternatives may be automatic, three speed, four speed, and five speed. The vast number of permutations coupled with the fact that only a subset of the permutations are actually offered for sale as products is a source of frustration to a customer with a given set of needs. For instance red cars may come only with manual transmission and not automatic transmission. As features and alternatives

3

proliferate, so does the level of frustration in isolating the one desired item. Accordingly, there is a need for a method to aid a user in identifying an item among a family of items based on selections of alternatives among features associated with the items.

Different customers have different preferences, and in many cases a customer is somewhat flexible concerning the product to buy as long as the customer is informed as to how the selection of one alternative affects the availability of another alternative. In addition, one customer may want a red car and accept manual transmission, while another customer must have automatic transmission and color is unimportant. Accordingly, there is a need for a search method that provides information interactively as to how certain alternative selections affect the number of remaining alternatives and/or matching items and allows a user to modify selection priorities during the course of the search.

There remains a need, therefore, for an automated search and retrieval system that can assist a user in finding a product having appropriate features to address identified needs and priorities of needs.

Associated with some known electronic search and retrieval systems is a certain amount of frustration when the defined search does not identify a single item. The user is obliged to further widen the field of search or modify a search criteria in order to identify any parts. The need to oblige the user to widen the field of search is due to the fact that hierarchial and keyword Boolean searches do not have any information in the search criteria to permit automatic adjustment of the field of search. There is a need therefore, for a electronic search method that is able to guarantee a user that at least one item will be identified.

SUMMARY OF THE INVENTION

It is therefore an object of the invention to provide a guided parametric search to isolate a subfamily of items within a family of items based on alternatives associated with each item.

It is a further object of the invention to organize the alternatives into groupings visually relating a feature and respective alternatives.

It is a further object of the invention to provide an automated search that interactively indicates how selected alternatives affects availability of remaining alternatives.

It is a further object of the present invention to provide an automated search method that can guarantee identification of at least one item for each search.

It is a feature of the present invention that a user is assisted in identifying a subfamily of items within a family of items by: providing a computer readable data file of stored information representing at least one family of items, the data file identifying at least one alternative for each item, reading the data file, displaying a feature screen indicating said alternatives represented in the family, accepting selected alternatives, determining the subfamily of items where each item in the subfamily satisfies the selected alternatives, determining available alternatives represented in the subfamily and unavailable alternatives unrepresented in the subfamily, and revising the feature screen indicating the available alternatives as distinct from the unavailable alternatives.

It is an advantage of the invention that revision of the feature screen provides an indication to the user as to how selected alternatives, or selection criteria, affect the profile of the subfamily satisfying the selection criteria. The revision

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answers the question; How does the selection of one alternative affect my remaining alternatives?

It is a feature of the invention that the process may be implemented in a server and client configuration for use on the Internet.

It is an advantage of the invention that an Internet configuration may be used as an electronic catalog, providing an electronic alternative to updating and distributing product and/or service information.

Other advantages and results of the invention are apparent from the following detailed description by way of example, from accompanying drawings, and from the spirit and scope of the appended claims.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a view of a Main Menu screen.

FIG. 2 is a view of an Alphabetical Search screen.

FIG. 3 is a view of a second level Picture Search screen.

FIG. 4 is a view of a View catalog screen.

FIG. 5 is a view of a Catalog page screen.

FIG. 6 is a view of a View part number information screen.

FIG. 7 is a view of a feature screen prior to selections of alternatives having been made by a user.

FIG. 8 is a view of a feature screen subsequent to a single selection of an alternative and completion of a search initiated by a user after revision based upon the results of the search.

FIG. 9 is a view of a revised feature screen subsequent to a second selection of an alternative from the revised feature screen shown in FIG. 8 and completion of a search initiated by a user after revision based upon the results of the search which has identified a single item.

FIG. 10 is a view of a Property screen for the item identified in the feature screen in FIG. 9.

FIG. 11 is a graphical representation of the Database Organization Datafile and example data records therein.

FIG. 12 is a graphical representation of the Part Number Features Datafile and example data records therein.

FIG. 13 is a graphical representation of the feature screen Group Datafile and example data records therein.

FIG. 14 is a graphical representation of the feature screen Description Datafile and example data records therein.

FIG. 15 is a graphical representation of the Feature Name Datafile and example data records therein.

FIG. 16 is a graphical representation of the Feature Value Datafile and example data records therein.

FIG. 17 is a graphical representation of the feature screen Image Datafile and example data records therein.

FIG. 18 is a graphical representation of the Part Number Properties Datafile and example data records therein.

FIG. 19 is a graphical representation of the Extra Properties Datafile and example data records therein.

FIG. 20 is a graphical representation of the Screen Title Datafile and example data records therein.

FIG. 21 is a graphical representation of the program flow of an embodiment of the feature screen creation operation labeling the groupings for a unique feature screen.

FIG. 22 is a graphical representation of the program flow of an embodiment of the feature screen creation operation labeling the alternatives.

FIG. 23 is a graphical representation of the program flow of an embodiment of the Search operation initiated from the feature screen.

FIG. 24 is a graphical representation of the program flow of an embodiment of the feature screen revision operation.

FIG. 25 is a representation of a server and client configuration and the flow of data therebetween.

FIG. 26 is a feature screen used in a preferred embodiment of the invention in an Internet environment.

FIG. 27 is a feature screen revised from the feature screen of FIG. 26 and having "Non-Insulation Support" and "None" for the "Specials" feature as selected alternatives and is updated with available alternatives underlined and unavailable alternatives not underlined.

FIG. 28 is a further revision of the feature screen of FIG. 27 narrowing down the subfamily to thirteen items.

FIG. 29 is a further revision of the feature screen of FIG. 28 narrowing down the subfamily to one item.

FIG. 30 is a property screen used in a preferred embodiment of the invention in the Internet environment.

FIG. 31 is a main menu used in a preferred embodiment of the invention in the Internet environment.

FIG. 32 is an alphabetical search menu used in a preferred embodiment of the invention in the Internet environment.

FIGS. 33 and 34 is a first and second level picture search menu respectively used in a preferred embodiment of the invention in the Internet environment.

FIG. 35 is a view part number menu used in a preferred embodiment of the invention in the Internet environment.

DETAILED DESCRIPTION

A nonhierarchical guided parametric search is executed on a computer and permits a user to select a family of items 1 from among a plurality of families of electrical connectors, via a Main Menu 40. A family of items 1 could be any commercial product or service offering with a common set of features 5 and alternatives 6, associated therewith. Preferably, the alternatives 6 are item qualifiers and related to customer purchase options and criteria. In a preferred embodiment, an example of a family of items 1 is FASTON Receptacles—Uninsulated. FASTON is a trademark of AMP Incorporated. Alternative embodiments may include a family 1 of service providers having features 5 and alternatives 6 relating to provider qualifications. It is apparent, therefore, that "family" as used herein is broadly defined as a collection of offerings with specific qualifiers and/or attributes, where one would want to identify an offering by specifying its qualifiers and/or attributes. The preferred embodiment, however, is adapted to a family of physical items, specifically electrical connectors.

An example of the Main Menu 40 is shown in FIG. 1. The Main Menu 40 offers an interactive pick for an Alphabetical Search 41, a Picture Search 42, a View Catalog 43, or a Get Part Number Information 44 as methods for identifying a single family of items 1. The About pick 49 provides administrative information about the vendor such as telephone number, address, and facsimile phone number. The Exit pick 50 exits to the computer operating system.

An example of an Alphabetical Search menu is shown in FIG. 2. The Alphabetical Search pick 41 provides to the user a list box 15 comprising alphabetical listbox entries 16 of industry standard terms and proprietary terms for product families 1 that are available on a data file to be searched. Each listbox entry 16 in the Alphabetical Search menu represents either a subfamily 2, a family of items 1 or a cluster of families 4. The user selects an alphabetical entry 16 and OK pick 51. If the selected listbox entry 16 represents a cluster of families 4, the system branches to a picture

search 42 described herein below. The user further delineates the family of items 1 that is of interest by further selection within the cluster 4 using a hierarchical selection method. If the alphabetical entry 16 requires no further delineation, the system branches to a feature screen 9. The cancel pick 52 returns the user to the Main menu 40.

The user enters a Picture Search Menu via either the picture search pick 42 from the Main Menu 40 or by selecting an alphabetical entry 16 from the Alphabetical Search Menu 41 that requires further delineation before identifying a single family of items 1. A picture search provides to the user a display of a series of pictures 17, each picture 17 representing either a family cluster 4 or a family of items 1 that are available to be searched. A series of picture 17 appears on one or more display pages. A page marker 58 indicates the current page and the total number of pages in the display. Prior screen pushbutton 201 returns the user to the prior screen. Home pushbutton 202 returns the user to the Main Menu 40. Help pushbutton 203 provides help text for the picture screen. The user, via a mouse or other pointing device, moves an interactive pointer 39 from picture to picture 17. As the pointer 39 passes over each picture 17, a picture subtitle 48a, indicating the name of the family 1 or cluster of families 4 represented by the picture 17, changes accordingly. The user selects a family 1 or cluster of families 4, by clicking the mouse as the pointer 39 is positioned over the desired representative picture 17. If the selected picture represents a family cluster 4, the system branches to a lower level picture search. An example of a second level picture search menu is shown in FIG. 3. In the lower level picture search, the system provides to the user a display of a series of pictures that further delineates the families 1 available within the selected family cluster 4. The user again selects one of the pictures presented and continues in this hierarchical fashion until isolating a selection that represents a single family of items 1. If the selected picture represents a single family 1, the system branches directly to the feature screen 9.

The View Catalog pick 43 provides the user with one of three types of free field entry. The user selects a radio button 23 to identify the nature of a free field entry 21. In a preferred embodiment, the user may select to enter by a part number 18, by a code associated with a part number that is identified by AMP Incorporated as a FaxCode 19, or a catalog number 20. The user enters an identifying number in the free field entry 21. Upon entry, the system electronically displays a catalog page for the identified item. An example of a catalog page is in FIG. 5. Once an item is selected, the system permits the user to branch to a display of tools and other items related to the identified item 3 by selecting the view option 53. A user may choose the zoom option 54 to display the catalog page in a size that is one hundred percent of the original size of the actual paper based catalog page. Zoom is purely a scaling function of the existing screen display. A user may choose the page option 55 to page through electronic displays of catalog pages as one might page through a paper based catalog system.

The Get Part Number Information pick 44 provides the user with a part number entry 22. The user enters a part number indicative of a single item 3. The user selects the radiobutton 23 to choose either a feature screen display or a Detailed Information Screen display for the item entered. If the part number is an item within the data file, the system retrieves the item 3 and identifies the family 1 associated with the part number and branches to the selected screen.

The process up to this point identifies a family 1 of items using conventional hierarchical techniques. Other methods of identifying a family 1 are equally appropriate.

Upon identification of a family 1 to search, the system provides to the user the feature screen 9. Identification of a subfamily or item is processed from the same feature screen 9. The minimum computing system required to run the process disclosed hereinafter has an Intel 80386 microprocessor or compatible upgrade with 4 MBytes of RAM memory, MS DOS revision 6.0 or compatible upgrade, Microsoft Windows revision 3.1 or compatible upgrade, a mouse or other pointing device, a hard disk with 2 MBytes of free disk space, and a Windows compatible CD-ROM drive.

The feature screen 9, as shown in FIGS. 7 through 9, provides a display of a series of groupings 13 associated with the selected family 1. Each grouping 13 comprises one of the features 5 and a plurality of respective alternatives 6, each feature 5 and respective alternatives being represented within the family 1. Each feature 5 generally describes a category of subject of the respective alternatives 6. The grouping 13 visually relates the feature 5 to its respective alternatives 6 by the proximity of feature 5 to respective alternatives and by a frame 24 enclosing them. Each grouping 13 contains either a plurality of the radiobuttons 23 or one listbox 15. Each alternative 6 has associated therewith, a user selector. The user selector may be in the form of a radiobutton 23 that is white to denote nonselection ("off") and partially filled in black to denote selection ("on"). A user selector may also be in the form of a listbox entry 16 that is in a standard font to denote nonselection ("off") and is in a reverse font to denote selection ("on"). The alternatives 6 may be selected or deselected via the radiobuttons 23 or listbox entries 16 to create selected alternatives 37. The feature screen 9, therefore, provides a guided search in that it presents terminology for the features 5 and the alternatives 6 to the user prior to a search. A screen title 48 appears centered at the top of the display and the representative picture 17 appears in the upper right corner of the display. A matching quantity box 47 and part number identification box 46 appear at the upper left corner of the display.

Positioning the interactive pointer 39 and clicking the mouse once, toggles a radiobutton 23 or listbox entry 16 to select ("on") or deselect ("off") an alternative 6. While in the feature screen 9, the user may select and deselect turning radiobuttons 23 and listbox entries 16 "on" and "off" as desired. In response to a user initiated signal to perform a search, the system retrieves information concerning which user selectors 16, 23 are turned "on" and to which alternatives 6 the user selectors 16, 23 that are turned "on" relate. The alternatives 6 turned "on" are the selected alternatives 37 and constitute the selection criteria 14 used in the search to generate a subfamily 2. In a preferred embodiment of the system, a double mouse click on a user selector 23 or 16 that is turned "off" selects the alternative 6 and then performs a search using the selection criteria 14.

A series of pushbuttons 201 through 208 are positioned below the matching quantity box 47 and part number identification box 46. Actuation of any one of the pushbuttons 201 through 208 via a mouse click performs a different system function. The prior screen pushbutton 201 returns the user to the prior screen. The home pushbutton 202 returns the user to the Main Menu 40. Help pushbutton 203 provides the user with help information concerning the current screen. Criteria hold pushbutton 204 "holds" or memorizes the current selection criteria 14 for later use. Criteria apply pushbutton 205 "applies" the selection criteria 14 most recently "held" using the criteria hold pushbutton 204. Advantageously, a selection criteria 14 "held" while working with one family may be "applied" while working with a different family.

Erasure pushbutton 206 resets all currently selected alternatives 37. Detail view pushbutton 207 displays a property screen 12. An example of the property screen 12 is shown in FIG. 10. Search pushbutton 208 performs a search according to the selection criteria 14.

When the user initiates a search via the search pushbutton 208 or a double mouse click, the system gathers the selection criteria 14 from the user selectors 16, 23 that are toggled "on", indicating the selected alternatives 37. Using the selection criteria 14, the system searches the family 1 for items 3 that satisfy the selection criteria 14. A result of the search is a subfamily 2 of items, each item 3 within the subfamily 2 having alternatives 6 that match the selection criteria 14. The system then searches the subfamily 2 to identify those alternatives 6 that remain available for further selection, available alternatives 7, and those alternatives 6 that are available within the family 1, but are mutually exclusive with the selection criteria 14 that generated the subfamily 2, unavailable alternatives 8.

Based on the available alternatives 7, the system revises the feature screen 9. A feature screen revised accordingly is shown in FIG. 8. In FIG. 8, the feature screen of FIG. 7 is revised after selection of alternative 6 "Magnet Wire" in the grouping associated with the feature 5 "Wire Type". Each selected alternative 37 is displayed in a bold font and underlined. Each available alternative 7 within the subfamily 2 is displayed in a bold font and is not underlined. The radiobutton 23 for each selected alternative 37 and each available alternative 7 is enabled, meaning that they may be toggled in order to modify the current selection criteria 14. An exception exists if one of the groupings 13 comprises only one available alternative 7. In that case, the available alternative 7 is a forced alternative 34 and is turned "on", and the associated radiobutton 23 is disabled meaning it may not be deselected. A forced alternative 34 indicates that for the selection criteria 14, all items necessarily have the forced alternative 34, and that there is no item satisfying the selection criteria 14 without the forced alternative 34. In FIG. 8, an example of a "forced" alternative is "None" in the "Specials" grouping 13. This indicates that for all items 3 having "Magnet Wire" as a "Wire Type" there are no other "Specials" alternatives 6 other than "None". Each unavailable alternative 8 within the subfamily 2 is displayed on the feature screen 9 and within the grouping 13, but is displayed in a grey shaded font. A radiobutton 23 associated with each unavailable alternative 8 is disabled. In the case of a grouping 13 that comprises one of the listboxes 15, only available alternatives 7 are listed as listbox entries 16. The feature screen 9 also displays the quantity of items in the subfamily 2 in a matching quantity box 47.

After the feature screen is revised, the user may choose to modify the selection criteria 14 by selecting one or more available alternatives 7 or deselecting a selected alternative 37. Unavailable alternatives 8 may not be selected to modify the selection criteria 14 as their associated radiobuttons 23 are disabled. Similarly, forced alternatives 34 may not be deselected. This impairs the user's ability to select mutually exclusive alternatives 6.

The user may select one or more available alternatives 7 and then initiate a search by clicking twice or using the search pushbutton 208. The system performs an identical search to the one disclosed hereinabove and revises the feature screen accordingly. By virtue of the fact that selected alternatives 37 are added to the selection criteria 14, the subfamily 2 that satisfies the selection criteria 14 necessarily has fewer items 3. A search and revision of the feature screen 9 after each selected alternative 37 provides to the user an

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indication of how selection of one alternative affects the availability of remaining alternatives 6. Presentation of the affect of selected alternatives guides the user in selecting appropriate alternatives 6 according to the user's priorities. Iterative selections, searches, and revisions progressively narrows the subfamily 2 to isolate and identify a manageable number of items according to user priorities. A narrowing of the subfamily 2 from the feature screen 9 shown in FIG. 8 is shown in FIG. 9 and identifies a single item 3.

If the user has turned more than one user selector "on" prior to processing a search, it is conceivable that the selection criteria 14 contains mutually exclusive alternatives and will produce a subfamily 2 containing zero items 3. In the event of a zero item subfamily 2, an embodiment of the system indicates that no items are identified, and returns the user to the feature screen prior to initiating a search. As a zero item subfamily situation is considered undesirable, when there are no items in a subfamily 2, in a preferred embodiment the system will deselect a most recently selected alternative 37 and perform the search with a revised selection criteria 14. The deselection process will iterate, automatically deselecting the most recently selected alternative until there is at least one item 3 in the subfamily 2. Sequential deselection will provide a prioritized approach of automatically revising the selection criteria 14 and guaranteeing identification of at least one item for every search initiated. Automated deselection is based on the assumption that the alternative selected first in time is the highest priority in the selection criteria 14, with subsequent selections of alternatives 6 having descending priority to the user.

The user may also modify the selection criteria 14 by deselecting one of the selected alternatives 37. Deselecting is accomplished by clicking the mouse once with the mouse pointer on one of the selected alternatives 37 to toggle the associated radiobutton 23 "off". User deselection of one of the selected alternatives 37 not part of the selection criteria 14 simply toggles the associated radiobutton 23 to "OFF". User deselection of one of the selected alternatives 37 that was part of the selection criteria 14 toggles the associated radiobutton 23 to "OFF" and, automatically initiates a search process to update the subfamily 2 and revise the feature screen 9 accordingly. User deselection and search is particularly helpful after identifying a family 1 via the Get Part Number Information Pick 44. Using the Get Part Number Information Menu and user deselection, the user, starting with a single part, may easily find a similar item by deselecting one or more of the selected alternatives 37.

In certain cases, a grouping 13 logically applies only if an alternative from a different grouping is selected. In this case, selection of a trigger alternative (not shown) within one grouping, will give rise to available alternatives 7 in a dependant grouping (not shown). Selection of one of the alternatives 6 in the dependant grouping will further refine the trigger alternative selection. With respect to cars for example, one grouping may be "transmission style" having "automatic transmission" and "manual transmission" as alternatives 6. The trigger alternative, "manual transmission", will give rise to the dependant grouping, "number of speeds" having alternatives 6 "three speed", "four speed", and "five speed". The alternatives 6 in the dependant grouping are not applicable to the users selection criteria 14 unless the trigger alternative is selected. In a preferred embodiment, therefore, the dependant grouping will not be displayed until selection of the trigger alternative. Although this is part of a preferred embodiment, it is not included in the source code disclosed herein.

Alternatively, in a less preferred embodiment, all of the groupings 13 for a feature screen are initially displayed. If,

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as a result of a search and for a subfamily 2, all of the alternatives 6 within one of the groupings 13 are unavailable alternatives 8, the grouping 13 is hidden and is not displayed. An example of a hidden grouping is illustrated in FIGS. 7 and 8 wherein the "Line" feature has no available alternatives 7 for the selection criteria 14 comprising "Magnet Wire".

At any point in the feature screen 9, a user may select the detail view pushbutton 207 to branch to the property screen 12. An example of the property screen 12 is shown in FIG. 10. The property screen 12 displays the feature 5 and specific alternatives for a single item 3 in a tabular format, a feature table 32. The property screen 12 further displays additional properties 28 associated with the item 3 in a tabular format a property table 33. Also displayed is a picture display of a line art 29 associated with the item 3, a comment area 30 and a subfamily part number list 31. A user may select any one of the part number entries 16 in the subfamily part number listbox 31 for display in the property screen 12.

The prior screen pushbutton 201, home pushbutton 202, and help pushbutton 203 are available from the property screen 12. View catalog pushbutton 209 branches the user to a screen with a representation of a catalog page for the item identified. In the embodiment of an electronic catalog for electrical connectors, the view catalog pushbutton 209 branches to the screen an example of which is shown in FIG. 5. Print pushbutton 210 prints out the property screen 12.

The feature screen 9 and the processing associated therewith is a piece of an overall electronic catalog system which includes additional operations such as the Alphabetical search, Picture search, View Catalog, and Get Part Number Information. Only those datafiles and operations associated with the feature screen 9 and property screen 12 will be described hereinafter.

A Database Organization Datafile 60 defines the features 5 used in each unique feature screen 9 and the features 5 and properties 28 used in each unique property screen 12. A graphical representation of records in the Database Organization Datafile 60 is shown in FIG. 11. Each record in the Database Organization Datafile 60 defines a set of features or properties and has seventeen fields: screen type 601, screen 602, and feature one through feature fifteen 603. The screen type field 601 contains a value of "F" if the record defines features 5 and a value of "P" if the record defines properties 28. The screen field 602 contains a numerical value that represents each feature screen 9 or Property screen 12. If the screen type field 601 contains a value of "F", the feature one field 603 through feature fifteen field 603 each contains a value that represents one unique feature 5 associated with one of the groupings 13 on the feature screen 9. If the screen type field 601 contains a value of "P", the feature one field 603 through feature fifteen field 603 each contains a value representing one of the properties 28 to be listed on the property screen 12. The property screen 12 also uses the information in the record defining the feature screen 9 having the same value in the screen field 602 to display features 5 in the feature table 32. There are fifteen feature fields 603 per record. The feature screen 9, therefore, may contain up to fifteen features 5 and the property screen 12 may contain up to fifteen features 5 in the feature table 32 and up to fifteen properties 28 in the property table 33. If one or more of the feature fields 603 is blank, then the feature screen 9 or property screen 12 represented by the record will contain a number of groupings 13 less than fifteen and a property screen represented by the record will have fewer than 15 features in the feature table 32 and/or fewer than fifteen properties in the property table 33.

A Part Number Features Datafile 61 indicates the alternatives 6 for each feature 5 represented by an item 3. A graphical representation of records in the Part Number Features Datafile 61 is shown in FIG. 12. Each record in the Part Number Features Datafile 61 has eighteen fields: screen 611, item 612, alternative one 613 through alternative fifteen 613, and locate 614. The Part Number Features Datafile screen field 611 contains a value representing one feature screen 9. All records within the Part Number Features Datafile 61 having the same value in the screen field 611 constitute a family of items 1. The value contained within the Part Number Features Datafile screen field 611 is used to cross reference to the Database Organization Datafile 62 screen field 602 having the same value and having a screen type field 601 containing a value of "F" for feature screen type. The feature one through feature fifteen fields 603 of the Database Organization Datafile 60 correspond directly to alternative one through alternative fifteen fields 613 in the Part Number Features Datafile 61. The item field 612 contains a part number that represents a single item 3 in a family 1. The alternative one field 613 through alternative fifteen field 613 each contain a value representing one alternative 6 that is associated with the item 3 represented by one record. Each item 3 may be defined by up to fifteen alternatives 6. If any of the alternative one 613 through alternative fifteen fields 613 does not contain a value, then the field is unused and the alternative does not apply to the item. The locate field 614 contains a duplicate representation of the values contained in the feature screen field 611 and the alternative one through alternative fifteen fields 613, in a single field.

In order to determine which alternatives 6 relate to each item 3, cross reference is made between the Database Organization Datafile 60 and the Part Number Features Datafile 61. Each record in the Part Number Features Datafiles 61, defines one item 3. Associated with the item, by virtue of being contained in the same record, is a value contained within the screen field 611. Cross reference is made to the Database Organization Datafile 60 screen field 602 having the same value as the Part Number Features Datafiles 61 screen field 611 value and a screen type 601 value of "F". Values in the feature one 603 through feature fifteen fields 603 correspond to values in the alternative one 613 through alternative fifteen fields 613 to define which alternative 6 within each of the up to fifteen defined features 5 is represented by the item 3. In this way, therefore, each item 3 is defined as comprising a characteristic set of alternatives 6.

The Feature Screen Group Datafile 62 defines a profile of each feature screen 9 and the groupings 13 contained therein. A graphical representation of records in the feature screen Group Datafile 62 is shown in FIG. 13. Each record of the feature screen Group Datafile 62 has four fields: a screen 621, a grouping sequence 622, selection type 623, and feature 624. The screen field 621 contains a value representing one feature screen. This number represents the same feature screen as is represented in all data files having a screen field 602, 611, 621, 631, 692, 661, 671 and is used for cross referencing purposes. The feature field 624 contains a unique number associated with one feature 5 and the grouping sequence field 622 contains a value representing a placement sequence of the grouping 13 on the feature screen 9. The selection type field 623 contains a value of "R" if alternatives 6 associated with the grouping 13 are selected via radio buttons 23 or a value of "L" if alternatives associated with the grouping 13 are selected via listbox entries 16. Although not implemented in a preferred

embodiment, alternatives 6 may also be selected via a checklist (not shown), in which case the selection type field 623 will have a value of "C".

The feature screen Description Datafile 63 defines the profile of the alternatives 6 for each feature 5 for a particular feature screen 9. A graphical representation of records in the feature screen Description Datafile 63 is shown in FIG. 14. Each record of the feature screen Description Datafile 63 has four fields: screen 631, feature 632, alternative sequence 633, and alternative 634. The screen field 631 and feature field 632 contain values representing one feature screen 9 and feature 6 respectively similar to those found in the feature screen Group Datafile 62 screen field 621 and feature field 624. The alternative field 634 contains a value representing an alternative 6 of the feature 5 specified in feature field 632. The alternative sequence field 633 represents the sequential position of the alternative 6 listed in alternative field 634 if the grouping 632 has a selection type 623 of radio button, "R", or checklist "C".

The Feature Name Datafile 64 cross references an alphanumeric name for each feature 5. A graphical representation of records in the Feature Name Datafile 64 is shown in FIG. 15. Each record has two fields: feature 641 and name 642.

The Feature Value Datafile 65 cross references numbers representing features 5 and alternatives 6 with an alphanumeric name. A graphical representation of records in the Feature Value Datafile 65 is shown in FIG. 16. Each record in the Feature Value Datafile 65 has three fields: feature 651, alternative 652, and name 653. The system uses the value in the name field 653 to appropriately caption alternatives 6 within the groupings 13 on the feature screen 9.

The feature screen Image Datafile 66 defines an image file name of the picture 17 that is displayed in the upper right hand corner of the feature screen 9. A graphical representation of records in the feature screen Image Datafile 66 is shown in FIG. 17. Each record in the feature screen Image Datafile 66 has two fields: a screen 661 and an image file name 662. The value contained within the screen field 661 specifies the feature screen 9. The value contained within the image file name field 662 is the name of a data file from which the system may retrieve a bitmapped representation of the representative picture 17 associated with the family of items 1 being searched in the specified feature screen 9.

A Part Number Properties Datafile 67 indicates the alternatives 6 represented for each item 3 for use with the Property Screen 12. A graphical representation of records in the Part Number Properties Datafile 67 is shown in FIG. 18. Each record in the Part Number Properties Datafile 67 has seventeen fields; screen 671, item 672, and alternatives one 673 through alternative fifteen 673. The Part Number Properties Datafile screen field 671 contains a value representing one property screen 12. The value contained within the Part Number Properties Datafile screen field 671 is used to cross reference to the Database Organization Datafile 60 screen field 602 having the same value and having a screen type field 601 containing a value of "P" for property screen. The item field 672 contains a part number that represents a single item 3. The alternative one field 673, alternative two field 673 through alternative fifteen field 673 each contain a value representing a single alternative 6 that is associated with the item 3 represented by one record. One item 3 is defined by up to fifteen alternatives. If any of the alternative one through alternative fifteen fields 673 does not contain a value, then the field is unused and the alternative does not apply.

An Extra Properties Datafile 68 defines additional characteristics for each item 3 for display in the Property Screen

12. A graphical representation of records in the Extra Properties Datafile 68 is shown in FIG. 19. The additional characteristics do not represent alternatives and may not be searched, they are, however, displayed in the comment area 30 on the Property screen 12 as additional item information. Each record has three fields; item 681, comment 682, and image 683. The item field 681 contains a number representing one item 3.

The Screen Title Datafile 69 cross references the screen number and screen type with an alphanumeric string. A graphical representation of records in the Screen Title Datafile 69 is shown in FIG. 20. Each record in the Screen Title Datafile 69 has three fields: screen type 691, screen 692, and title 693. The system uses the value in the title field 693 to appropriately label Screens with the identifying title 48 at the top of all system screens.

The minimum system requirements for development of software to implement the process herein disclosed includes all hardware required for the system to use the software as well as Microsoft Visual Basic 3.0 Professional Edition and Accusoft Image Library VBX.

There are three program level files associated with the feature screen; FEATURES.FRM, GLOBAL.BAS, DATA.BAS, and PROPERTI.FRM. The PROPERTI.FRM is used to process property screen forms. FEATURES.FRM contains variable declarations and subroutines used to process feature screen forms. GLOBAL.BAS contains variable declarations global to the entire electronic catalog application software. DATA.BAS contains subroutines, global to the entire application software, that are executed by FEATURES.FRM, PROPERTI.FRM as well as other application forms. There are three main operations executed by FEATURES.FRM; feature screen Creation, Search, and feature screen Revision. Central to all three operations is a FrameInfo data array having one to fifteen elements.

GLOBAL.BAS defines the global variable FrameInfo having a data structure of FrameInfoType. FrameInfoType is also defined in GLOBAL.BAS. In a preferred embodiment, the FrameInfoType data structure includes; Feature, Type, CurSelection, DBColumn, DBFeatureNum, RBFeatVal array from 0 to 7 elements, RBStatus array from 0 to 7 elements, SelectionOrder and NotApplicable, and is initialized to zero at the start of the feature screen operation. The executable code for the feature screen also uses a form, FRM 101, which is defined off line using the Visual Basic software tool. FRM 101 defines, among other things, an interactive screen having fifteen frames and all relevant pushbuttons 25, each frame 24 containing eight radiobuttons 23 and a listbox 15. FRM 101 is a general and consistent screen structure adapted by FrameInfo data to display a particular feature screen 9.

After identifying a particular family of items 1 to search using the Alphabetical Search, the Picture Search, the Get Part Number Information, or other identification system, the system uses FEATURES.FRM passing to it a global variable ScreenNum 102. ScreenNum 102 indicates a numerical code for the appropriate feature screen 9 and is associated with one family of items 1 to be searched. ScreenNum 102 is the value contained in the screen fields 602, 611, 621, 631, 661, 671 and 692 associated with a particular feature screen 9.

The feature screen creation operation comprises an iterative loop that loads the FrameInfo data array in proper sequential grouping order with the appropriate data. A graphical representation of an embodiment of the feature screen creation operation flow to provide the grouping captions 57 is shown in FIG. 21. A loop repeats for each grouping 13 defined for the feature screen 9 incrementing an ordinate 103 for each iteration. The number of groupings 13 and hence the number of iterations of the loop is up to fifteen

in a preferred embodiment, although the system does not preclude modification of this number. For each sequential grouping 13, the system accesses the feature screen Group Datafile 62 to locate the record having a value in the screen field 621 and grouping sequence field 622 equal to Screen-Num 102 and the current FrameInfo ordinate 103 respectively. For the record located, FrameInfo(ordinate).Type is set equal to the value in the selection type field 623 and FrameInfo(ordinate).Feature is set equal to the value in the feature field 624. If FrameInfo(ordinate).Type is equal to "L", then the listbox 15 for the grouping 13 identified in the grouping sequence field 622 is made visible. In a preferred embodiment, if there are more than eight alternatives 6 associated with one of the groupings 13, the grouping 13 comprises a listbox 15. The system uses the value in FrameInfo(ordinate).Feature to cross reference the Feature Name Datafile 64 and locates the record having the same value in the feature field 641. The caption 57 of the grouping 13 is set equal to the string value in the name field 642 of the record. The above operation continues, the result of which is to provide the caption 57 or name, representing a feature 5, for each grouping 13 on the feature screen 9.

The feature screen creation operation further comprises iterating a FrameInfo ordinate 103 from one to as many groupings 13 that exist for the feature screen 9. A graphical representation of an embodiment of the feature screen creation operation program flow labeling the alternatives 6 is shown in FIG. 22. A nested operation iterates a count 104 corresponding to the number of alternatives 6 within the grouping 13 from zero to as many records as are found. When no matching records are found, the count is reset to zero, and the ordinate increments. The system uses Screen-Num 102, FrameInfo(ordinate).Feature, and count 104 plus one to cross reference the feature screen Description Datafile 63 and locate the record having matching values in the screen field 631, feature field 632, and alternative sequence field 633 respectively. The system uses FrameInfo(ordinate).Feature and alternative field 634 in the matching record in the feature screen Description Datafile 63 to cross reference the Feature Value Datafile 65 and locate a record having a match with the feature 651 and alternative 652 fields respectively. The name field 653 of the located record is used to label the respective alternative 6.

If FrameInfo(ordinate).Type is equal to "R", meaning that the grouping 13 is a set of radiobuttons 23, FrameInfo(ordinate).RBFeatVal(count) is set equal to the value in the alternative field 634 of the matching record in the feature screen Description Datafile 63. The radiobutton 23 is labeled with the string value in the name field 653 of the matching record in the Feature Value Datafile 65.

If the FrameInfo(ordinate).Type has a value of "L", meaning that the grouping 13 is a listbox 15, the same cross referencing and locating a matching record in the feature screen Description Datafile 63 and the Feature Value Datafile 65 as in the case of the radiobutton 23 described hereinabove applies. In the case of a listbox 15, however, the Visual Basic system organizes listbox entries 16 alphabetically. The string value in the name field 653 is inserted as a listbox entry 16 for the grouping 13. The value in the alternative field 634 is stored in an ItemData array (not shown) associated with the listbox 15. The ItemData array is inherent to Microsoft Windows and is part of a conventional listbox definition and building operation of Visual Basic. The result of the operation is properly captioned alternatives 6, as either radiobuttons 23 or listbox entries 16 for each grouping 13 used in the feature screen 9. In a preferred embodiment, if there are more than 8 alternatives 6 for one of the feature 5 in the family 1, the grouping 13 comprises a listbox. This particular distinction between the appropriate grouping style is a matter of design choice. When the

grouping 13 and alternative 6 captions are set, the system adjusts the size of frames surrounding each grouping 13 to aesthetically pleasing proportions and adjacent spacings.

The feature screen creation operation further comprises identifying, for each grouping 13, the column position of a corresponding feature 5 in the Database Organization Datafile 60. The column position is stored into FrameInfo.DBColumn. The program flow of this operation is not shown in the drawings. The system locates the record in the Database Organization Datafile 60 having a value of "F", meaning feature screen, in screen type field 601, and a value in the screen field 602 equal to ScreenNum 102. The FrameInfo.DBFeatureNum array is set equal to the values in the feature one 603 through grouping fifteen fields 603 respectively for the record located. Incrementing the ordinate for each value in the FrameInfo(ordinate).Feature array, the system locates the position of the equivalent value in the FrameInfo.DBFeatureNum array. FrameInfo(ordinate).DBColumn is set equal to the position of the equivalent value in the FrameInfo.DBFeatureNum array.

Subsequent to the feature screen creation operation, response to the user's mouse movements and mouse clicks are administered by the Visual Basic System. If the user clicks on one of the radiobuttons 23, the system executes a subroutine entitled Radio\_Click defined in FEATURES.FRM. Based upon the vicinity of the pointer 39, the system identifies the sequential position of a current grouping 35 within the feature screen 9 and the sequential position of a current alternative 36 within the current grouping 35 to identify a FrameInfo(ordinate).RBStatus(count). If the pointer 39 is resting on one of the available alternatives 7 that is also an unselected alternative 38, the FrameInfo.CurSelection for the current grouping 35 is set equal to the value of the current alternative 36 and FrameInfo.RBStatus for the current grouping 35 and the current alternative 36 is set to a negative one meaning "SELECTED". In a preferred embodiment capable of the automated deselective search, when one of the alternatives 6 is selected, the FrameInfo.SelectionOrder for the current grouping 35 is set equal to a NumberOfSelections variable (not shown) plus one and the NumberOfSelections variable is incremented. If the pointer 39 is resting on one of the alternatives having a FrameInfo.RBStatus of negative two meaning "FORCED" or zero meaning that it is one of the unavailable alternatives 8, there is no operation. If the pointer 39 is resting on one of the available alternatives 7 that is selected, then FrameInfo.CurSelection for the current grouping is reset. The NumberOfSelections variable is decremented and the FrameInfo.Selection order is resequenced. The system initiates a search operation.

If the user clicks on one of the listbox entries 16, the system executes a subroutine entitled ListBox\_click in FEATURES.FRM. The system identifies the current grouping 35 and the current alternative 36. If the pointer 39 is resting on one of the available alternatives 7 that is not selected, the FrameInfo.CurSelection for the current grouping 35 is set equal to the current alternative 36 and FrameInfo.SelectionOrder is set equal to a value of the maximum current SelectionOrder which is expressed in the NumberOfSelections variable plus one and the NumberOfSelections variable is incremented. If the pointer 39 is resting on one of the available alternatives 7 that is selected, then FrameInfo.CurSelection for the current grouping 35 is reset. The NumberOfSelections variable is decremented and the FrameInfo.Selection order is resequenced. The system initiates a search operation.

When the user either selects the search pushbutton 208 or double clicks on one of the unselected alternatives 38, the system performs a search operation using the current selection criteria 14. The current selection criteria 14 is defined as

the set of selected alternatives 37 for the feature screen in which the user is operating, and is found in the FrameInfo.CurSelection array. A graphical representation of an embodiment of the search operation program flow is shown in FIG. 23. At the beginning of the search, in order to administer the radiobuttons 23, the system initializes the FrameInfo.RBStatus array for all available alternatives 7 to zero, and initializes FrameInfo.NotApplicable for all groupings 13 to zero. In order to administer the listboxes 15, a two dimensional dynamically allocated ListStatus array (not shown) is declared having a first dimension of fifteen and a second dimension of one. A ListStatusSize variable (not shown) is initialized to one and retains a value representing the size of the second dimension of the ListStatus array. A ListCounter array (not shown) having fifteen elements records the number of entries 16 added to each listbox 15 and is initialized to zero.

The system identifies all of the items 3 that match the current selection criteria 14. Using FrameInfo.CurSelection the system cross references to the Part Number Features Datafile 61 to locate a record having a value in the appropriate alternative field 613 equivalent to the first nonzero FrameInfo.CurSelection. Incrementing an ordinate 103, the system identifies a FrameInfo(ordinate).CurSelection having a value greater than zero. FrameInfo(ordinate).DBColumn is used to identify the appropriate column in the Part Number Features Datafile 61. The system locates a record in the Part Number Features Datafile 61 having a matching value in the appropriate column. When a record is located having the alternative 6 that matches, the system compares the remaining alternatives 6 in the selection criteria 14 against values in the alternative fields 613 corresponding to the alternatives in the selection criteria 14. The system checks the remaining nonzero FrameInfo.CurSelection value against values in the appropriate alternative one through alternative fifteen fields 613. If all of the selected alternatives 37 in the selection criteria 14 have a corresponding alternative field 613 in the located record, the located record is a matching record for the current selection criteria 14. The matching record, therefore, represents an item 3 in the subfamily 2.

The system processes each item 3 in the subfamily 2 to identify which alternatives 6 are available alternatives 7 within the subfamily 2. If the record is a matching record, the alternative fields 613 in the matching record not specified in the selection criteria 14, are processed in an iterative loop to update the available alternatives 7 and unavailable alternatives 8 in FrameInfo. FrameInfo is used to revise the feature screen 9 based upon the results of the selection criteria 14 and search or more precisely, based upon the existing subfamily 2.

For each alternative field 613 checked, the following operation applies. If the alternative field 613 has no value, meaning that the grouping 13 associated with the alternative field 613 is not applicable to the item 3 defined in the matching record, the FrameInfo.NotApplicable is set to a value of one. The FrameInfo.NotApplicable variable is, therefore, zero if all items 3 in the subfamily 2 have a value in the alternative field 613 for the respective grouping 13, and is nonzero if any one item 3 in the subfamily 2 has no value in the respective alternative field 613 for the respective grouping 13. FrameInfo.NotApplicable having a nonzero value indicates that the associated grouping does not logically apply to all of the items in the subfamily 2. Therefore, with respect to a preferred embodiment, if FrameInfo.NotApplicable is set to nonzero, the respective grouping 13 is not displayed. Alternatively, in a less preferred embodiment, a grouping 13 is not displayed if all of the respective alternatives 6 are unavailable alternatives 8.

If the grouping 13 is a set of radiobuttons 23, and the alternative field 613 has a value, FrameInfo.RBStatus asso-

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ciated with the grouping 13 and alternative 6 specified in the alternative field 613 is set to a one, meaning that the radiobutton 23 for the specified alternative 6 is an available alternative 7. Available alternatives 7 are shown on the feature screen 9 in a bold font. If the grouping 13 is a listbox 15 and the alternative field 613 has a value, the system determines whether the alternative 6 specified in the alternative field 613 is already listed in the ListStatus array. If the alternative 6 has not already been added, the ListCounter is incremented for the respective listbox 15, the ListStatusSize is set to reflect the size of the largest listbox, and if necessary, the ListStatus array 110 is dynamically allocated a single additional element. The ListStatus array 110 for the sequential position of the grouping 13, specified in the first dimension, and the sequential position of the alternative 6, specified in the second dimension, is set equal to the value in the alternative field 613. The operation repeats for all alternative fields 613 that were not used to locate an item from the selection criteria.

In a preferred embodiment, if a search operation results in a subfamily 2 having no items 3, the most recently selected alternative will be automatically deselected and the search operation will repeat with the revised selection criteria 14. The automatic deselection of the most recently selected alternative will repeat until the search operation results in a subfamily 2 having at least one item 3. Although not implemented in the source code of the software disclosed herein, the automatic deselection operation would be implemented as follows. Where FrameInfo(ordinate).SelectionOrder is equal to the NumberOfSelections variable, the FrameInfo(ordinate).CurSelection and FrameInfo(ordinate).SelectionOrder will be reset to zero, and the Number of Selections will be decremented. The same search process will be initiated using the new selection criteria 14. The automatic deselection will repeat until the search results in a subfamily 2 having one or more items 3.

The entire FrameInfo updating process occurs for every record in the Part Number Features Datafile 61. The results of the Searching operation are updated FrameInfo and ListStatus arrays. The FrameInfo and ListStatus arrays are used to revise the feature screen according to the results of the search.

Using the updated FrameInfo and ListStatus arrays, the system revises the feature screen 9 accordingly in the feature screen revision operation. A graphical representation of an embodiment of the feature screen revision operation is shown in FIG. 24. The feature screen revision operation comprises enabling radiobuttons 23 for the available alternatives 7, disabling the radiobuttons 23 for the unavailable alternatives 8, identifying and disabling the radiobuttons 23 for forced alternatives 34, updating the ItemData array with listbox entries 16 for the available alternatives 7 and unavailable alternatives 8, and removing the grouping 13 from the feature screen 9 if all of the alternatives 6 in the grouping 13 are unavailable alternatives 8. A loop incrementing the ordinate 103 iterates for each grouping 13. In a preferred embodiment, if FrameInfo.NotApplicable is nonzero, the grouping 13 associated with the FrameInfo(ordinate) will not be displayed. If the grouping 13 comprises radiobuttons 23, the radiobutton 23 associated with each element in the FrameInfo.RBStatus array that equals zero is disabled. If the grouping 13 is a listbox 15, the ListStatus array for the grouping 13 is searched against the ItemData array. If an element in the ItemData array for the grouping 13 is not found in the ListStatus array 110, it is removed from the ItemData array and therefore does not appear as one of the listbox entries 16. For each grouping 13 that does not contain a selected alternative 37, the system counts the number of available alternatives 7 in the FrameInfo(ordinate).RBStatus array. If there is one and only

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available alternative 7, the one available alternative 7 is set to a negative two, meaning "FORCED", and the associated radiobutton 23 is turned "on" and is displayed as partially filled in black, but it is disabled meaning that it may not be toggled to "off" during the feature screen manipulation operation.

After the feature screen revision operation, the system returns to the feature screen manipulation operation permitting the user to modify the selection criteria 14 based upon the results of the search.

In an embodiment of the invention in an Internet environment, there is a server computer 125 and a client computer 126. All of the program files and data files described in the local embodiment reside on the server 125. In the Internet embodiment, the server 125 comprises a computer having a minimum of 8 Mbytes of RAM and 50 MBytes of available hard disk memory and an Intel Pentium processor running Microsoft Windows 3.1. The server 125 may have hardware access to the Internet via any conventional method. Server 125 communication on the Internet uses Microsoft Windows World Wide Web Server using HyperText Transport Protocol ("HTTPD") from the National Center for Supercomputing Applications ("NCSA") at the University of Illinois and Windows TCP/IP package that supports Windows Sockets interface, preferably Chameleon TCP/IP for Windows by NetManage, Inc. of Cupertino, Calif. The client 126 is a computer having a minimum of 4 MBytes of RAM and an Intel 80386 processor running Microsoft Windows 3.1 and having a display device, keyboard, and mouse. The client 126 has TCP/IP access to the Internet, such as Chameleon by NetManage. The client 126 also requires a Mosaic compatible browser, such as AIR Mosaic by SPRY, Inc. of Seattle, Wash.

A preferred embodiment of the Internet embodiment of the electronic catalog application mirrors the user flow in the local embodiment as much as possible. Based upon certain restrictions inherent in current Internet capabilities with respect to building an interactive screen, the feature screen 9 for the Internet embodiment has a layout that is slightly different from the local embodiment. The feature screen 9 for the Internet embodiment is shown by way of example in FIGS. 26 through 29.

The client 126 initiates a request to the server 125 for the electronic catalog searching application via the Internet. The server 125 detects the request. Receipt of the request executes the requested application on the server 125 that permits a user on the client 126 to select a family 1 or subfamily 2. Example of Main Menu, Alphabetical search, Picture Search, and View Part Number screens are shown in FIGS. 31 through 35. When the family 1 or subfamily 2 is chosen, the server 125 sends a feature screen status 127 to the client 126. The feature screen status 127 comprises a feature screen code, ScreenNum 102 in a preferred embodiment, all features 5 appropriate to the feature screen 9 specified in ScreenNum 102, all available alternatives 7, all unavailable alternatives 8, and the selection criteria 14. As the selection criteria 14 is always sent, it may comprise zero selected alternatives 37. It is apparent, therefore, that the server 125 sends all of the information necessary to define the current subfamily 2 to the client 126. The information, therefore, need not be retained in memory on the server 125. This particular feature renders it particularly appropriate for an Internet environment. The client 126 receives the feature screen status 127 and displays the feature screen 9 accordingly. An example of the feature screen 9 on the Internet is shown in FIGS. 26 through 29. The user on the client, makes selections from among the available alternatives 7 generating a selection criteria 14 different from that which was set to it. The client 126 initiates a search with the modified selection criteria 14. The

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client 126 sends to the server 125, the ScreenNum 102 value sent to it by the server, and the modified selection criteria 14. The server 125 receives the ScreenNum 102 and the selection criteria 14. The server 125 executes the search operation as disclosed hereinabove using the revised selection criteria 14 and generates the feature screen status 127. The server 125 sends the feature screen status 127 that has been updated based on the modified selection criteria 14 to the client 126. The client 126 receives the feature screen status 127 and displays the updated feature screen 9. This process may iterate similar to the local version to further narrow the subfamily as desired.

The feature screen 9 in a preferred embodiment, permits the user to choose to view the representative picture 17 by selecting a view family picture pushbutton 211. When the user on the client 126 selects the view family picture pushbutton 211, the client 126 sends a request to the server 125 for the picture 17 as well as the feature screen code, ScreenNum 102.

The user accesses the property screen 12 by selecting the detail view pushbutton 207. An example of the property screen 12 format for the Internet embodiment is shown in FIG. 30. When the user on the client 126 selects the detail view pushbutton 207, the client 126 sends to the server 125 the feature screen code, ScreenNum 102, and the selection criteria 14. The server 125 returns the features 5, the alternatives 6, the properties 28, and the line art 29 for the item 3, or the first item in a larger subfamily 2, satisfying the selection criteria 14. To view the property screen 12 for the next item 3 listed in the subfamily 2, the user on the client 126 selects a next pushbutton 212. Selection of the next pushbutton 212 causes the client 126 to initiate a request to the server 125. The client 126 sends to the server 125 the feature screen code, the selection criteria 14, a request for property screen information, and an indication of which item of the subfamily 2 is of interest.

What is claimed is:

1. A method for assisting a user in identifying a subfamily of items within a family of items, comprising the steps of:
  - (a) providing a computer readable data file of stored information representing at least one family of items, said data file identifying at least one alternative for each item,
  - (b) reading said data file,
  - (c) displaying a feature screen indicating said alternatives represented in the family,
  - (d) accepting a first selection criteria of at least one alternative,
  - (e) determining a first subfamily of items wherein each said item in the first subfamily satisfies said first selection criteria,
  - (f) determining available alternatives represented in the first subfamily,
  - (g) revising said feature screen to indicate the available alternatives of the first subfamily,
  - (h) accepting a second selection criteria comprising the alternative or alternatives of the first selection criteria plus at least one alternative selected from the revised feature screen,
  - (i) determining a second subfamily of items of the family wherein each item in the second subfamily satisfies said second selection criteria,

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- (j) determining available alternatives represented in the second subfamily, and
- (k) revising said feature screen to indicate the available alternatives of the second subfamily.
2. The method of claim 1 wherein each family has at least one feature associated therewith and further comprising the step of  
displaying at least one grouping wherein each said grouping comprises one of said features visually related to respective alternatives.
3. The method according to claim 2 and further comprising the step of:  
providing an interactive pointer and displaying information specific to one of said features upon a user initiated signal when said pointer is pointing to a feature caption on said feature screen.
4. The method according to claim 2 wherein at least one said groupings is hidden from view if all said respective alternatives are not available.
5. A method for assisting a user in identifying a subfamily of items within a family of items, comprising the steps of:
  - (a) providing a computer readable data file of stored information representing at least one family of items, said data file identifying at least one alternative for each item,
  - (b) reading said data file,
  - (c) displaying a feature screen indicating said alternatives represented in the family,
  - (d) accepting a selection criteria of more than one of said alternatives,
  - (e) determining the subfamily of items wherein each said item in the subfamily satisfies said selection criteria,
  - (f) in the event the subfamily comprises zero items, deselecting the most recently selected alternative of that selection criteria,
  - (g) determining the subfamily of items wherein each said item in the subfamily satisfies said selection criteria as modified by the deselection of the most recently selected alternative,
  - (h) revising said feature screen to indicate the available alternatives of the subfamily.
6. The method of claim 5 wherein each family has at least one feature associated therewith and further comprising the step of  
displaying at least one grouping wherein each said grouping comprises one of said features visually related to respective alternatives.
7. The method according to claim 6 and further comprising the step of:  
providing an interactive pointer and displaying information specific to one of said features upon a user initiated signal when said pointer is pointing to a feature caption on said feature screen.
8. The method according to claim 6 wherein at least one said groupings is hidden from view if all said respective alternatives are not available.

\* \* \* \* \*



# **Exhibit 3**



(12) **EX PARTE REEXAMINATION CERTIFICATE (7845th)**  
**United States Patent**  
**Danish et al.**

(10) **Number:** **US 6,275,821 C1**  
(45) **Certificate Issued:** **Nov. 2, 2010**

(54) **METHOD AND SYSTEM FOR EXECUTING A GUIDED PARAMETRIC SEARCH**

OTHER PUBLICATIONS

(75) Inventors: **Mohamed Sherif Danish**, Los Altos Hills, CA (US); **Kris Walter Kimbrough**, Sunnyvale, CA (US)

(73) Assignee: **Partsrivier Inc.**, Menlo Park, CA (US)

**Reexamination Request:**

No. 90/009,316, Oct. 28, 2008

**Reexamination Certificate for:**

Patent No.: **6,275,821**  
Issued: **Aug. 14, 2001**  
Appl. No.: **09/384,303**  
Filed: **Aug. 26, 1999**

**Related U.S. Application Data**

(63) Continuation of application No. 08/943,573, filed on Oct. 3, 1997, now Pat. No. 5,983,219, which is a continuation of application No. 08/323,186, filed on Oct. 14, 1994, now Pat. No. 5,715,444.

(51) **Int. Cl.**  
**G06F 17/30** (2006.01)

(52) **U.S. Cl.** ..... **707/3**

(58) **Field of Classification Search** ..... None  
See application file for complete search history.

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*Primary Examiner*—B. James Peikari

(57) **ABSTRACT**

A process for identifying a single item from a family of items presents a user with a feature screen having a series of groupings. Each grouping represents a feature having a set of alternatives from which to select. Selected alternatives are used as a selection criteria in a search operation. Results of the search operation is a revised feature screen indicating alternatives that remain available to the user for further selection and searching. The feature screen and search process, therefore, presents the user with a guided nonhierarchical parametric search to identify matching items based upon user specified criteria and priorities. Also disclosed is an adaptation of the claimed method and system appropriate in an Internet environment.

**FASTON Receptacles - Uninsulated**

Matching Qty:  P/N:

209 3

Specials: ☒ None  
☐ For Potted Hermetic Tabs  
☐ Receptacle/Tab Combination

Tab Fit:

Receptacle Style: ☒ Straight 7  
☐ Flag 8  
☐ Reversible Flag

Insulation Support: ☒ Insulation Support 7  
☐ Non-Insulation Support 8

Wire Type: ☐ Regular Wire  
☒ Magnet Wire 14 37

Wire Range:

Insulation Dia.:

Insertion Force: ☒ Normal  
☐ Low

Material: ☒ Brass  
☐ Phosphor-Bronze  
☐ Steel

Finish: ☒ None 37  
☐ Tin  
☐ Pre Tin  
☐ Silver  
☐ Nickel

Crimp Type: ☒ "F"  
☐ Tab-Lok

1600

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**1**  
**EX PARTE**  
**REEXAMINATION CERTIFICATE**  
**ISSUED UNDER 35 U.S.C. 307**

THE PATENT IS HEREBY AMENDED AS  
INDICATED BELOW.

**Matter enclosed in heavy brackets [ ] appeared in the patent, but has been deleted and is no longer a part of the patent; matter printed in italics indicates additions made to the patent.**

AS A RESULT OF REEXAMINATION, IT HAS BEEN DETERMINED THAT:

Claim 1 is determined to be patentable as amended.

Claim 2, dependent on an amended claim, is determined to be patentable.

New claim 9 is added and determined to be patentable.

Claims 3-8 were not reexamined.

1. A method for assisting a user in identifying a subfamily of items within a family of items *said method performed with a server connected to a client computer through a computer network*, comprising the steps of:

- (a) providing a computer readable data file of stored information representing at least one family of items, said data file identifying at least one alternative for each item,
- (b) reading said data file,
- (c) displaying a feature screen indicating said alternatives represented in the family,
- (d) accepting a first selection criteria of at least one alternative,
- (e) determining a first subfamily of items wherein each said item in the first subfamily satisfies said first selection criteria,
- (f) determining available alternatives represented in the first subfamily,
- (g) revising said feature screen to indicate the available alternatives of the first subfamily,
- (h) accepting a second selection criteria [comprising] *from said client computer via said computer network at said server wherein the second selection criteria comprises a resubmission to the server of the alternative or alternatives of the first selection criteria plus at least one alternative selected from the revised feature screen,*

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(i) determining a second subfamily of items of the family wherein each item in the second subfamily satisfies said second selection criteria,

(j) determining available alternatives represented in the second subfamily, and

(k) revising said feature screen to indicate the available alternatives of the second subfamily.

9. *A method for assisting a user in identifying a subfamily of items within a family of items, the method comprising the following steps which are performed with a server connected to a computer network:*

(a) *providing a computer readable data file of stored information representing at least one family of items, said data file identifying at least one alternative for each item,*

(b) *reading said data file,*

(c) *displaying a feature screen indicating said alternatives represented in the family wherein data is output to a client computer via said computer network,*

(d) *receiving and accepting a first selection criteria of at least one alternative from said client computer, said first selection criteria being received by said server from said client computer via said computer network,*

(e) *determining a first subfamily of items wherein each said item in the first subfamily satisfies said first selection criteria,*

(f) *determining available alternatives represented in the first subfamily,*

(g) *revising said data for said feature screen to indicate the available alternatives of the first subfamily and outputting said revised data for said feature screen to said client computer via said computer network,*

(h) *receiving and accepting a second selection criteria from said client computer via said computer network, in which said second selection criteria comprises (1) a resubmission by said client computer of the alternative or alternatives of the first selection criteria along with (2) at least one alternative selected from the revised feature screen,*

(i) *determining a second subfamily of items of the family wherein each item in the second subfamily satisfies said second selection criteria,*

(j) *determining available alternatives represented in the second subfamily, and*

(k) *revising said data for said feature screen to indicate the available alternatives of the second subfamily and outputting said revised data for said feature screen to said client computer via said computer network.*

\* \* \* \* \*

# Exhibit 4





US006327588B1

(12) **United States Patent**  
**Danish et al.**

(10) **Patent No.:** **US 6,327,588 B1**  
(45) **Date of Patent:** **Dec. 4, 2001**

(54) **METHOD AND SYSTEM FOR EXECUTING A GUIDED PARAMETRIC SEARCH**

(75) Inventors: **Mohamed Sherif Danish**, Mountain View; **Kris Walter Kimbrough**, Sunnyvale, both of CA (US)

(73) Assignee: **Saqqara Systems, Inc.**, San Jose, CA (US)

(\*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **09/697,761**

(22) Filed: **Oct. 27, 2000**

#### Related U.S. Application Data

(63) Continuation of application No. 09/384,303, filed on Aug. 26, 1999, now Pat. No. 6,275,821, which is a continuation of application No. 08/943,573, filed on Oct. 3, 1997, now Pat. No. 5,983,219, which is a continuation of application No. 08/323,186, filed on Oct. 14, 1994, now Pat. No. 5,715,444.

(51) **Int. Cl.**<sup>7</sup> ..... **G06F 17/30**  
(52) **U.S. Cl.** ..... **707/3**  
(58) **Field of Search** ..... 707/1, 2, 3, 4, 707/5

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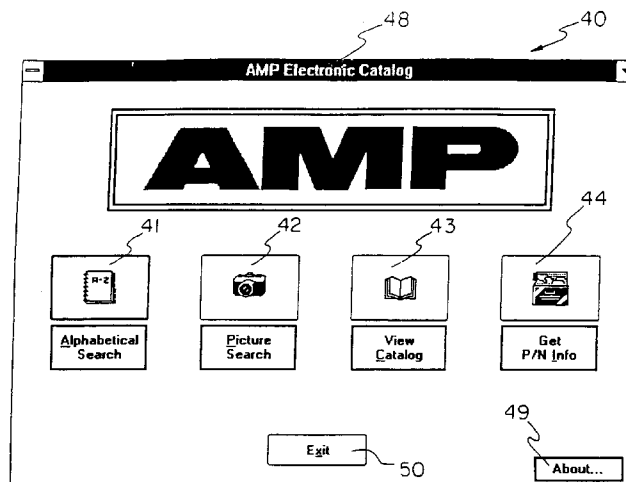
*Primary Examiner*—Jack M. Choules

(74) *Attorney, Agent, or Firm*—Gibson, Dunn & Crutcher LLP

(57) **ABSTRACT**

A process for identifying a single item from a family of items presents a user with a feature screen having a series of groupings. Each grouping represents a feature having a set of alternatives from which to select. Selected alternatives are used as a selection criteria in a search operation. Results of the search operation is a revised feature screen indicating alternatives that remain available to the user for further selection and searching. The feature screen and search process, therefore, presents the user with a guided nonhierarchical parametric search to identify matching items based upon user specified criteria and priorities. Also disclosed is an adaptation of the claimed method and system appropriate in an Internet environment.

**8 Claims, 30 Drawing Sheets**



MAIN MENU

US 6,327,588 B1

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- (a) providing a computer readable data file of stored information representing at least one family of items, said data file identifying at least one alternative for each item;
- 5 (b) reading said data file;
- (c) displaying a plurality of pictures from said data file, wherein each of said plurality of pictures represent said at least one family of items or represent a cluster of said at least one family of items;
- 10 (d) accepting a selected picture of said plurality of pictures;
- (e) determining if said selected picture represents said at least one family of items or said cluster of said at least one family of items;
- 15 (f) when said selected picture represents said at least one family of items, displaying a feature screen indicating said alternatives represented in said at least one family of items selected;
- (g) accepting at least one selected alternative, said at least one selected alternative defining a selection criteria;
- 20 (h) determining the subfamily of items wherein each said item in the subfamily satisfies said selection criteria;
- (i) determining available alternatives represented in the subfamily and unavailable alternatives unrepresented in the subfamily; and
- 25 (j) revising said feature screen to display said available alternatives as distinct from said unavailable alternatives.
- 30 **2.** The method according to claim 1 wherein when said determining step (e) determines that said selected picture represents said cluster of said at least one family of items: displaying a next plurality of pictures from said data file, wherein each of said next plurality of pictures represent said at least one family of items or represent a cluster of said at least one family of items;
- 35 repeating steps (d) and (e) for said next plurality of pictures until said accepted selected picture represents said at least one family of items; and
- 40 performing steps (f) through (j).
- 3.** The method according to claim 1 wherein said displaying step (c) further comprises: displaying said plurality of pictures from said data file distributively on a plurality of display pages, wherein a portion of said plurality of pictures are displayed on each of said plurality of display pages; and
- 45 accepting a selected one of said first plurality of display pages at a time for display.
- 4.** The method according to claim 1 further comprising: accepting mouse over input on a one of said displayed said first plurality of pictures from said data file;
- 50 when said mouse over input is on said one of said first plurality of pictures that represents said at least one family of items, displaying a picture subtitle of a name of the family; and
- 55 when said mouse over input is on said one of said first plurality of pictures that represents said cluster of said at least one family of items, displaying a picture subtitle of a name of the cluster of families.
- 60 **5.** The method according to claim 1 further comprising: storing said selection criteria related to said at least one family of items;
- accepting a selected next at least one family of items;
- 65 applying in a search said stored selection criteria related to said at least one family of items to said selected next at least one family of items.

I claim:  
1. A method for assisting a user in identifying a subfamily of items within a family of items, the method comprising:

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6. A method for assisting a user in identifying a subfamily of items within a family of items, the method comprising:
- (a) providing a computer readable data file of stored information representing at least one family of items, said data file identifying at least one alternative for each item; 5
  - (b) reading said data file;
  - (c) displaying a main menu screen with a part number entry; 10
  - (d) accepting entry of a part number in said part number entry for a part;
  - (e) identifying a family of items of which said part is a member;
  - (f) displaying a feature screen for said family of items of which said part is a member, wherein said feature screen indicates selected alternatives associated with said part in said family of items; 15
  - (g) accepting a deselected alternative, wherein said deselected alternative defines a broader selection criteria;

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- (h) determining a larger family of items wherein each item in said larger family of items satisfies said broader selection criteria; and
  - (i) revising said feature screen to display at least one more part, wherein said at least one more part is similar to said part and is a member of said larger family of items.
7. The method according to claim 6 wherein said revising step (i) further comprises:
- displaying on said feature screen a remaining selected alternatives associated with said larger family of items based on said broader selection criteria.
8. The method according to claim 6 further comprising: repeating steps (g) through (i) for a next deselected alternative, wherein said next deselected alternative defines a next broader selection criteria and a next larger family of items satisfying said next broader selection criteria, and said feature screen is revised to display at least one more additional part which is a member of said next larger family of items and is similar to said part.

\* \* \* \* \*



# **Exhibit 5**





US005983219A

**United States Patent** [19][11] **Patent Number:** **5,983,219****Danish et al.**[45] **Date of Patent:** **\*Nov. 9, 1999**[54] **METHOD AND SYSTEM FOR EXECUTING A GUIDED PARAMETRIC SEARCH**[75] Inventors: **Mohamed Sherif Danish**, Los Altos Hills; **Kris Walter Kimbrough**, Sunnyvale, both of Calif.[73] Assignee: **Saggara Systems, Inc.**, Sunnyvale, Calif.

[\*] Notice: This patent is subject to a terminal disclaimer.

[21] Appl. No.: **08/943,573**[22] Filed: **Oct. 3, 1997****Related U.S. Application Data**

[63] Continuation of application No. 08/323,186, Oct. 14, 1994, Pat. No. 5,715,444.

[51] **Int. Cl.<sup>6</sup>** ..... **G06F 17/30**[52] **U.S. Cl.** ..... **707/3**[58] **Field of Search** ..... 707/1, 3, 4[56] **References Cited****U.S. PATENT DOCUMENTS**

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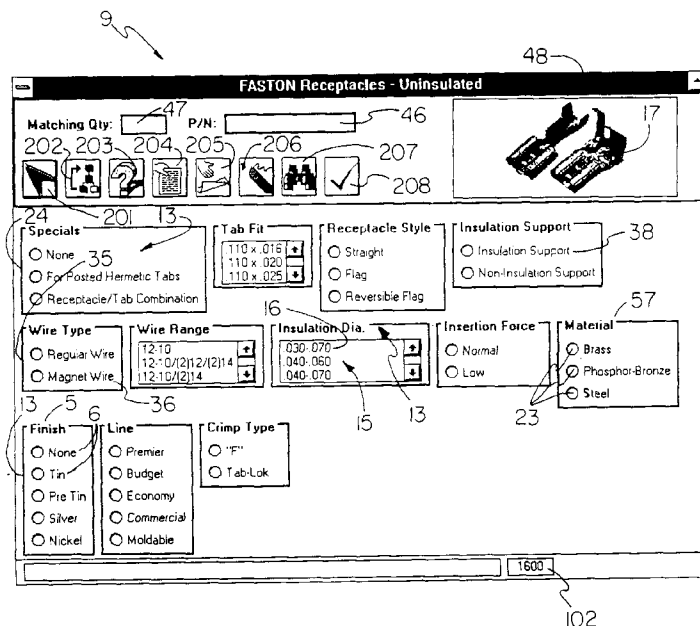
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AMP Booklet: "Your Introduction to EADS", #82829, 1991, AMP Incorporated, Harrisburg, PA.

*Primary Examiner*—Jack M. Choules*Attorney, Agent, or Firm*—Wilson, Sonsini, Goodrich & Rosati[57] **ABSTRACT**

A process for identifying a single item from a family of items presents a user with a feature screen having a series of groupings. Each grouping represents a feature having a set of alternatives from which to select. Selected alternatives are used as a selection criteria in a search operation. Results of the search operation is a revised feature screen indicating alternatives that remain available to the user for further selection and searching. The feature screen and search process, therefore, presents the user with a guided nonhierarchical parametric search to identify matching items based upon user specified criteria and priorities. Also disclosed is an adaptation of the claimed method and system appropriate in an Internet environment.

**20 Claims, 30 Drawing Sheets**

We claim:

1. A method of allowing a selection of a subset of items from a set of items using a server and a database, the server being coupled to the database, the method comprising:
- (a) responsive to receiving a first request, accessing the database, the database defining a set of groups, each group in the set of groups having a corresponding set of alternatives, the database defining at least one alternative for each item in the set of items, and wherein the set of groups includes at least one group having more than one alternative;
  - (b) transmitting a first response, the first response including first formatting information to display the set of groups and a first corresponding sets of alternatives, the first formatting information including instructions to simultaneously display at least two alternatives from the at least one group;

- (c) responsive to receiving a second request, accessing the database to determine the subset of items, the second request corresponding to a selection of at least an alternative from the set of groups, the subset of items all including the selected alternative; and
  - (d) transmitting a second response, the second response including second formatting information to display the set of groups and a second corresponding sets of alternatives, the second corresponding sets of alternatives being determined from the subset of items and including at least one unavailable alternative, the second formatting information including instructions to display the unavailable alternative and any available alternatives in the second set of alternatives.
2. The method according to claim 1 wherein the first and second requests correspond to an Internet protocol formatted request, and wherein the first and second responses correspond to an Internet protocol formatted response.
3. The method according to claim 1 wherein the first formatting information includes HTML formatted text wherein at least one alternative of the set of alternatives is shown as a hypertext link.
4. The method according to claim 3 wherein the first formatting information includes a name for each group in the set of groups, and wherein each name is not a link.
5. The method according to claim 1 wherein the transmitting the second information includes HTML formatted text wherein each available alternative is shown as a hypertext link and wherein each unavailable alternative is shown as text but is not a hypertext link.
6. The method according to claim 1 further comprising reducing the number of items in the subset of items by repeating the steps of accessing the database in response to the second request and transmitting the second response.
7. The method according to claim 6 further comprising increasing the number of items in the subset of items by deselecting a selected alternative if the subset of items comprises zero items.
8. The method according to claim 1 wherein the second information includes the information about the number of items in the subset of items.
9. A system for assisting a user in identifying a subfamily of items within a family of items, comprising the steps of:
- (a) means for providing a computer readable data file of stored information representing at least one family of items, wherein the family has features associated therewith and each said feature has alternatives associated therewith, the family comprising a plurality of items wherein each said item has one said alternative associated with each said feature,
  - (b) means for displaying said features and said alternatives on a feature screen;
  - (c) means for accepting at least one selected alternative;
  - (d) means for determining the subfamily wherein each item in the subfamily satisfies said selected alternatives;
  - (e) means for determining available alternatives and unavailable alternatives represented by the subfamily; and
  - (f) means for revising said feature screen to reflect said available alternatives as distinct from said unavailable alternatives.
10. The system according to claim 9 wherein, each said available alternative is displayed in a first format, each said unavailable alternative is displayed in a second format, and each said selected alternative is displayed in a third format.

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11. The system according to claim 9 wherein, said first format is a grey shaded font, and said second format is a bold font.

12. The system according to claim 9 and further comprising means for displaying at least one grouping, each said grouping comprising one of said features visually related to respective alternatives.

13. The system according to claim 12 wherein, if said grouping does not contain at least one available alternative, said grouping is not displayed.

14. The system according to claim 9 further comprising means for displaying a plurality of pictures, each said picture representing one family and being selectable by a user to identify one family.

15. The system according to claim 9 further comprising means for displaying an alphanumeric list of entries, each said entry representing one family and being selectable by a user to identify one family.

16. The system of claim 9 further comprising means for:

- (a) providing a user selector for each item of said subfamily,
- (b) receiving a signal identifying a single item within said subfamily, and
- (c) displaying additional information about said item.

17. The system of claim 16 wherein said additional information comprises detailed specifications concerning said item.

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18. The system of claim 16 wherein said additional information comprises a pictorial representation of said single member.

19. A system for assisting a user in identifying a subfamily of items within a family of items, comprising:

- (a) a database, the database representing at least one family of items and identifying at least one alternative for each item;
- (a) a computer system, being coupled to the database, having a first program to display available alternatives represented in the family, the computer system having an input to receive selected alternatives, the computer system further having a second program to determine a subfamily of items wherein each said item in said subfamily contains the selected alternatives, and wherein the first program revises the display to display said available alternatives represented in the subfamily as distinct from unavailable alternatives unrepresented in the subfamily.

20. The system according to claim 19 wherein, the computer system has a server computer coupled to a client computer, the server computer having the second program and the client computer having the first program.

\* \* \* \* \*

UNITED STATES PATENT AND TRADEMARK OFFICE  
**CERTIFICATE OF CORRECTION**

PATENT NO. : 5,983,219  
DATED : November 9, 1999  
INVENTOR(S) : Danish, et. al.

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Title page, item [73], Assignee: change "Saggara Systems, Inc." to --  
Saqqara Systems, Inc.--

Signed and Sealed this  
Fourth Day of July, 2000

Attest:



Q. TODD DICKINSON

Attesting Officer

Director of Patents and Trademarks

# **Exhibit 6**



US005715444A

**United States Patent** [19]

Danish et al.

[11] **Patent Number:** **5,715,444**[45] **Date of Patent:** **Feb. 3, 1998**[54] **METHOD AND SYSTEM FOR EXECUTING A GUIDED PARAMETRIC SEARCH**5,426,594 6/1995 Wright et al. .... 364/514 R  
5,544,360 8/1996 Lewak et al. .... 395/600[76] **Inventors:** **Mohamed Sherif Danish**, 12838 La Cresta Dr., Los Altos Hills, Calif. 94022; **Kris Walter Kimbrough**, 972-3 Belmont Terr., Sunnyvale, Calif. 94086**FOREIGN PATENT DOCUMENTS**

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*Primary Examiner*—Thomas G. Black*Assistant Examiner*—Jack M. Choules[21] **Appl. No.:** **323,186**[22] **Filed:** **Oct. 14, 1994**[51] **Int. Cl.<sup>6</sup>** ..... **G06F 17/30**[52] **U.S. Cl.** ..... **395/604**[58] **Field of Search** ..... 358/86, 342; 395/200, 395/600, 604, 601; 364/401[56] **References Cited****U.S. PATENT DOCUMENTS**

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5,319,542	6/1994	King, Jr. et al.	364/401

[57] **ABSTRACT**

A process for identifying a single item from a family of items presents a user with a feature screen having a series of groupings. Each grouping represents a feature having a set of alternatives from which to select. Selected alternatives are used as a selection criteria in a search operation. Results of the search operation is a revised feature screen indicating alternatives that remain available to the user for further selection and searching. The feature screen and search process, therefore, presents the user with a guided nonhierarchical parametric search to identify matching items based upon user specified criteria and priorities. Also disclosed is an adaptation of the claimed method and system appropriate in an Internet environment.

**35 Claims, 30 Drawing Sheets**

**FASTON Receptacles - Uninsulated**

Matching Qty:  P/N:

**Specials**

- ☒ None
- ☐ For Posted Hermetic Tabs
- ☐ Receptacle/Tab Combination

**Tab Fit**

- ☒ 250 x .020
- ☐ 250 x .032

**Receptacle Style**

- ☒ Straight
- ☐ Flag
- ☐ Reversible Flag

**Insulation Support**

- ☒ Insulation Support
- ☐ Non-Insulation Support

**Wire Type**

- ☐ Regular Wire
- ☒ Magnet Wire

**Wire Range**

- 
- 
- 

**Insulation Dia.**

- 
- 
- 

**Insertion Force**

- ☐ Normal
- ☐ Low

**Material**

- ☒ Brass
- ☐ Phosphor-Bronze
- ☐ Steel

**Finish**

- ☐ None
- ☐ Tin
- ☐ Pre Tin
- ☐ Silver
- ☐ Nickel

**Crimp Type**

- ☒ "F"
- ☐ Tab-Lok

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I claim:

1. A method for assisting a user in identifying a subfamily of items within a family of items, comprising the steps of:

- (a) providing a computer readable data file of stored information representing at least one family of items, said data file identifying at least one alternative for each item,
- (b) reading said data file,
- (c) displaying a feature screen indicating said alternatives represented in the family,
- (d) accepting at least one selected alternative, said at least one selected alternative defining a selection criteria,
- (e) determining the subfamily of items wherein each said item in the subfamily satisfies said selection criteria,
- (f) determining available alternatives represented in the subfamily and unavailable alternatives unrepresented in the subfamily, and
- (g) revising said feature screen to display said available alternatives as distinct from said unavailable alternatives.

2. The method according to claim 1 wherein each family has at least one feature associated therewith and further comprising the step of:

displaying at least one grouping wherein each said grouping comprises one of said features visually related to respective alternatives.

3. The method according to claim 2 wherein respective alternatives within one of said groupings are mutually exclusive of each other.

4. The method according to claim 2 and further comprising the step of:

providing an interactive pointer and displaying information specific to one of said features upon a user initiated signal when said pointer is pointing to a feature caption on said feature screen.

5. The method according to claim 2 wherein at least one of said groupings is hidden from view if all said respective alternatives are also unavailable alternatives.

6. The method according to claim 2 wherein at least one of said groupings comprises a trigger alternative, and further comprising the step of:

displaying a dependant grouping only if said trigger alternative is one of said selected alternatives.

7. The method according to claim 2 further comprising the step of:

automatically selecting one of said available alternatives if all remaining respective alternatives are unavailable alternatives.

8. The method according to claim 1 and further comprising the steps of:

modifying said selection criteria and repeating the steps of determining the subfamily, determining said available alternatives represented in the subfamily and unavailable alternatives unrepresented in the subfamily, and revising said feature screen.

9. The method according to claim 8 wherein said selection criteria is automatically modified by deselecting a most recently selected alternative if the subfamily comprises zero items.

10. The method according to claim 1 and further comprising the step of:

indicating the number of items in the subfamily.

11. The method according to claim 1 and further comprising the steps of:

displaying said available alternatives in a first format and displaying unavailable alternatives in a second format.

12. The method according to claim 11 and further comprising the step of:

displaying said selected alternatives in a third format.

13. The method according to claim 12 wherein said first format is a bold font and said second format is a grey shaded font and said third format is a bold and underlined font.

14. The method according to claim 1 wherein, the steps of providing a computer readable data file, reading said data file, and determining said subfamily are executed on a server and wherein, the steps of displaying said feature screen, accepting said selected alternatives, and revising said feature screen are executed on a client and further wherein, said server is accessible by said client.

15. The method according to claim 14 and further comprising the steps of:

said server receiving from said client a feature screen code and said selected alternatives, and

said server sending to said client a feature screen status.

16. The method according to claim 15 wherein, said feature screen status comprises:

said feature screen code, available alternatives, unavailable alternatives, and said selected alternatives.

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17. A method of assisting a user in identifying a subfamily of items within a family of items, comprising the steps of:

- (a) providing a computer readable data file of stored information representing at least one family of items, wherein the family has features associated therewith and each said feature has alternatives associated therewith, said family comprising a plurality of items wherein each said item has one said alternative associated with each said feature,
- (b) displaying said features and said alternatives on a feature screen,
- (c) accepting at least one selected alternative, said at least one selected alternative defining a selection criteria,
- (d) determining the subfamily wherein each item in the subfamily satisfies said selection criteria,
- (e) determining available alternatives and unavailable alternatives represented by the subfamily,
- (f) revising said feature screen to display said available alternatives as distinct from said unavailable alternatives.

18. The method according to claim 17 wherein, each said available alternative is displayed in a first format, each said unavailable alternative is displayed in a second format, and each said selected alternative is displayed in a third format.

19. The method according to claim 18 wherein, said first format is a grey shaded font, and said second format is a bold font.

20. The method according to claim 17 and further comprising the step of:

displaying at least one grouping, each said grouping comprising one of said features visually related to respective alternatives.

21. The method according to claim 20 wherein, if said grouping does not contain at least one available alternative, said grouping is not displayed.

22. The method according to claim 17 further comprising the step of:

displaying a plurality of pictures, each said picture representing one family and being selectable by a user to identify one family.

23. The method according to claim 17 further comprising the step of:

displaying an alphanumeric list of entries, each said entry representing one family and being selectable by a user to identify one family.

24. The method according to claim 17 further comprising the step of:

providing a user input area and receiving an alphanumeric reference for identifying a family.

25. The method of claim 17 further comprising the steps of:

- (a) providing a user selector for each item of said subfamily,
- (b) receiving a signal identifying a single item within said subfamily, and
- (c) displaying additional information about said item.

26. The method of claim 25 wherein said additional information comprises detailed specifications concerning said item.

27. The method of claim 25 wherein said additional information comprises a pictorial representation of said single member.

28. The method of claim 25 wherein said additional information comprises related items.

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29. A system for assisting a user in identifying a subfamily of items within a family of items, comprising:

- (a) a computer having memory, a display device, a user input device, and an interactive pointer,
- (b) a computer readable data file stored in said memory, said data file representing at least one family of items and identifying at least one alternative for each item,
- (c) a feature screen displayed on said display device, said feature screen indicating available alternatives represented in the family,
- (d) said user input device accepting at least one selected alternative, wherein said computer determines a subfamily of items wherein each said item in said subfamily contains said selected alternatives, and further wherein, said display device revises said feature screen to display said available alternatives represented in the subfamily as distinct from unavailable alternatives unrepresented in the subfamily.

30. The system according to claim 29 wherein, said computer having said computer readable data file comprises a server computer accessible by a client computer having said display device, said user input device, and said interactive pointer.

31. A method for assisting a user in identifying a subfamily of items within a family of items, comprising the steps of:

- (a) providing a computer readable data file of stored information representing at least one family of items, said data file identifying at least one alternative for each item,
- (b) reading said data file,
- (c) displaying a feature screen indicating said alternatives represented in the family,
- (d) accepting at least one selected alternative, said at least one selected alternative defining a selection criteria,
- (e) determining the subfamily of items wherein each said item in the subfamily satisfies said selection criteria, and modifying said selection criteria by,
- (f) automatically deselecting a most recently selected alternative and determining the subfamily of items wherein each said item in the subfamily satisfies said selection criteria,

until there is at least one item contained in said subfamily of items.

32. The method according to claim 31 and further comprising the steps of:

determining available alternatives represented in the subfamily and unavailable alternatives unrepresented in the subfamily, and

revising said feature screen indicating said available alternatives as distinct from said unavailable alternatives.

33. The method according to claim 31 and further comprising the steps of:

displaying said available alternatives in a first format and displaying unavailable alternatives in a second format.

34. The method according to claim 33 and further comprising the step of:

displaying said selected alternatives in a third format.

35. The method according to claim 32 further comprising the step of:

automatically selecting one of said available alternatives if all remaining respective alternatives are unavailable alternatives.

\* \* \* \* \*



# Exhibit 7



**United States Patent** [19]

Lane et al.

[11] **Patent Number:** 4,843,538[45] **Date of Patent:** \* Jun. 27, 1989

[54] **MULTI-LEVEL DYNAMIC MENU WHICH SUPPRESSES DISPLAY OF ITEMS PREVIOUSLY DESIGNATED AS NON-SELECTABLE**

[75] **Inventors:** Leslie A. Lane, Santa Clara; Lynn V. Lybeck, Moss Beach; David S. Perloff, Sunnyvale; Chester L. Mallory, Campbell, all of Calif.

[73] **Assignee:** Prometrix Corporation, Santa Clara, Calif.

[\*] **Notice:** The portion of the term of this patent subsequent to Jul. 7, 2004 has been disclaimed.

[21] **Appl. No.:** 208,965

[22] **Filed:** Jun. 20, 1988

**Related U.S. Application Data**

[60] Division of Ser. No. 864,024, May 16, 1986, Pat. No. 4,805,089, which is a continuation-in-part of Ser. No. 729,153, Apr. 30, 1985, Pat. No. 4,679,137.

[51] **Int. Cl.<sup>4</sup>** ..... G06F 15/46

[52] **U.S. Cl.** ..... 364/188; 364/200; 340/706

[58] **Field of Search** ..... 364/146, 188, 191, 192, 364/193, 171, 200 MS File; 340/706, 712, 707-711, 718

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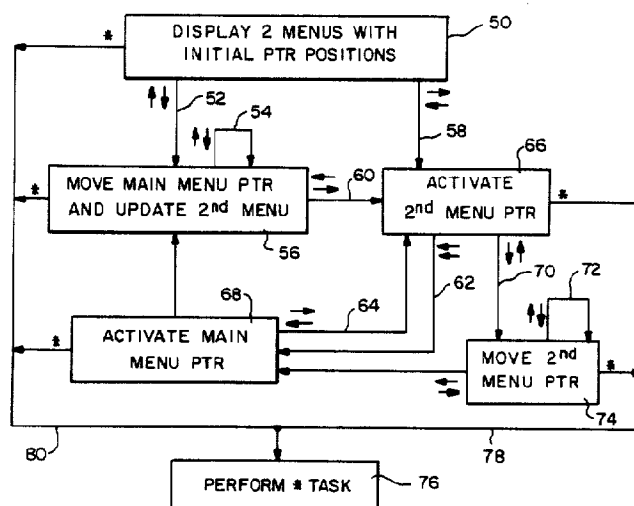
*Primary Examiner*—Clark A. Jablon

*Attorney, Agent, or Firm*—Flehr, Hohbach, Test, Albritton & Herbert

**ABSTRACT**

A process control interface includes a multi-level dynamic menu for selecting processes from a set of processes that are organized into groups and subgroups. An engineering set up control program enables an engineer to denote which of these groups, subgroups and processes are available for selection by an operator using the process control interface. Only those groups, subgroups and processes which are available for selection are displayed in the dynamic menu. The set of processes defined by the engineering set up control program can be stored on individual operator-related disks so that each operator has access to a distinct set of available processes. Process subgroups and groups can be duplicated by the engineering setup control program to facilitate the setting up of new control processes. In addition, the engineering set up control program can denote parameters used by a process as required entry parameters, fixed value parameters, operator alterable parameters, and single forced entry parameters—the latter being parameters which must be assigned a value only the first time that a process is run.

**9 Claims, 6 Drawing Sheets**



U.S. Patent

Jun. 27, 1989

Sheet 1 of 6

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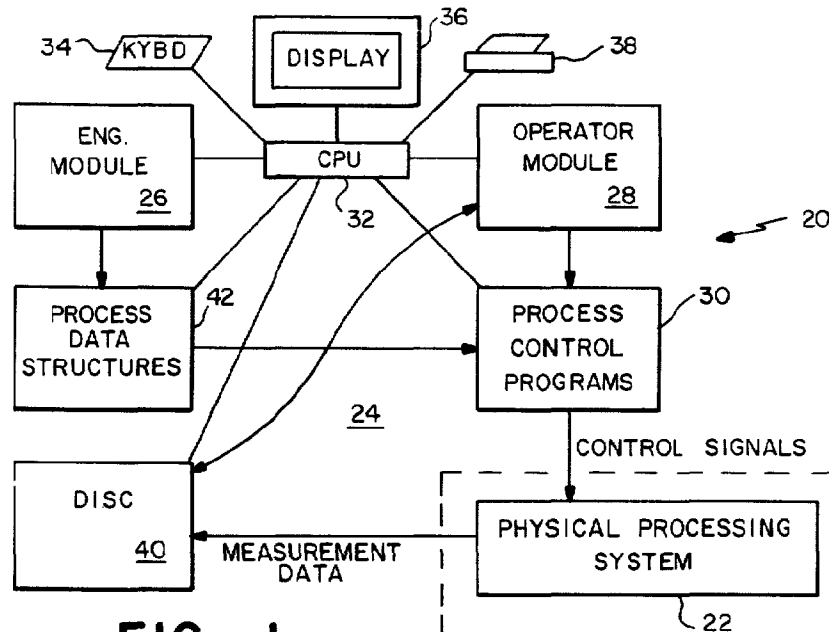


FIG. -1

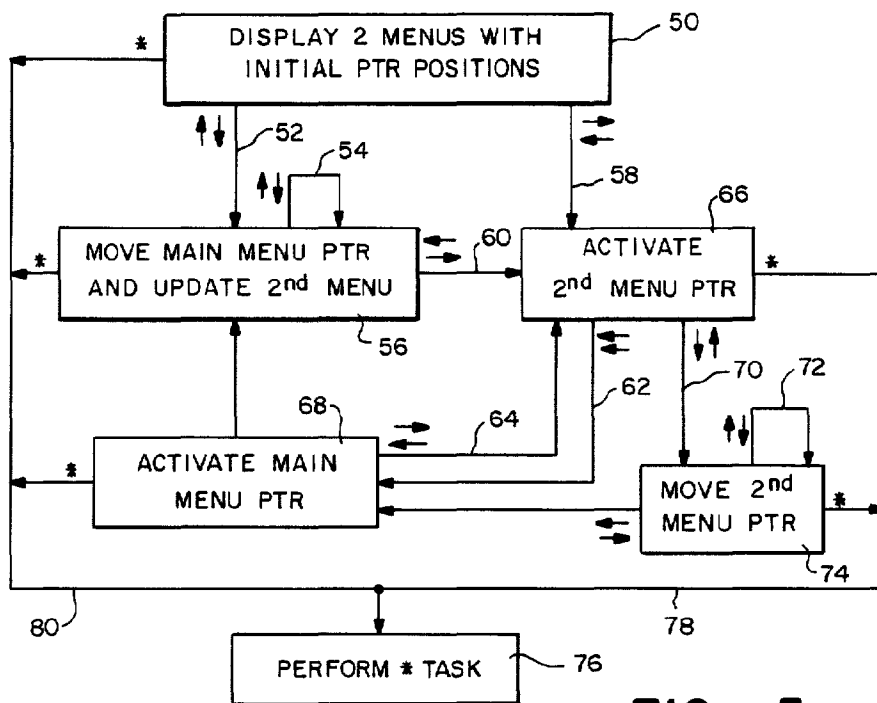


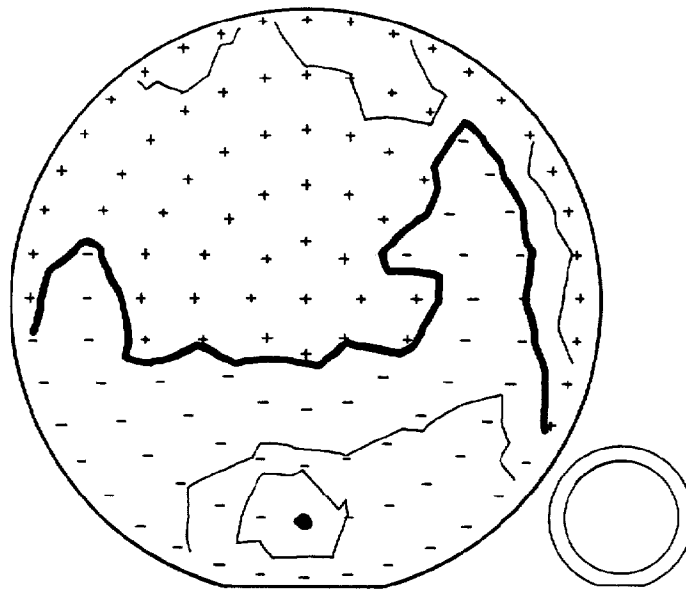
FIG. -5

**U.S. Patent**

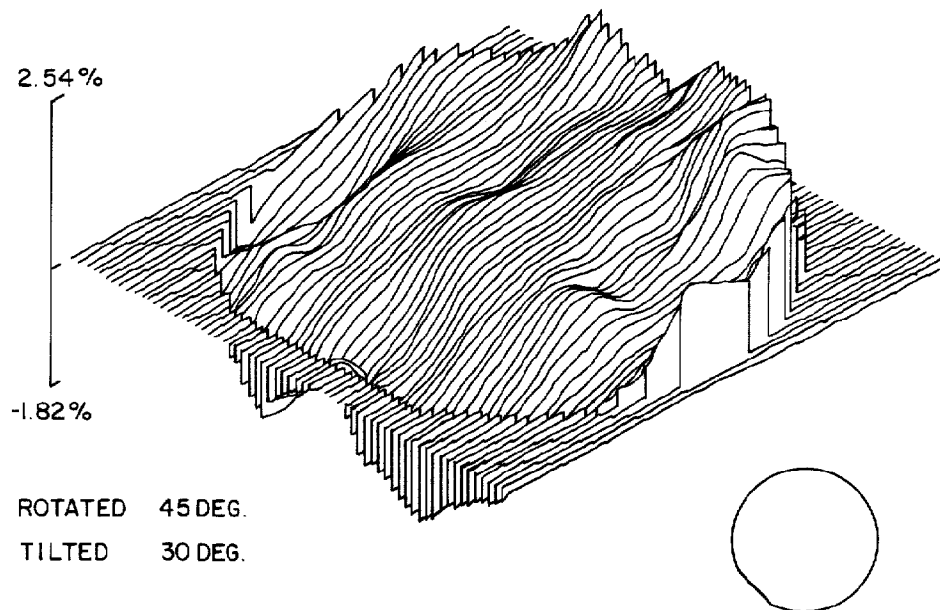
**Jun. 27, 1989**

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**FIG. -2**



**FIG. -3**

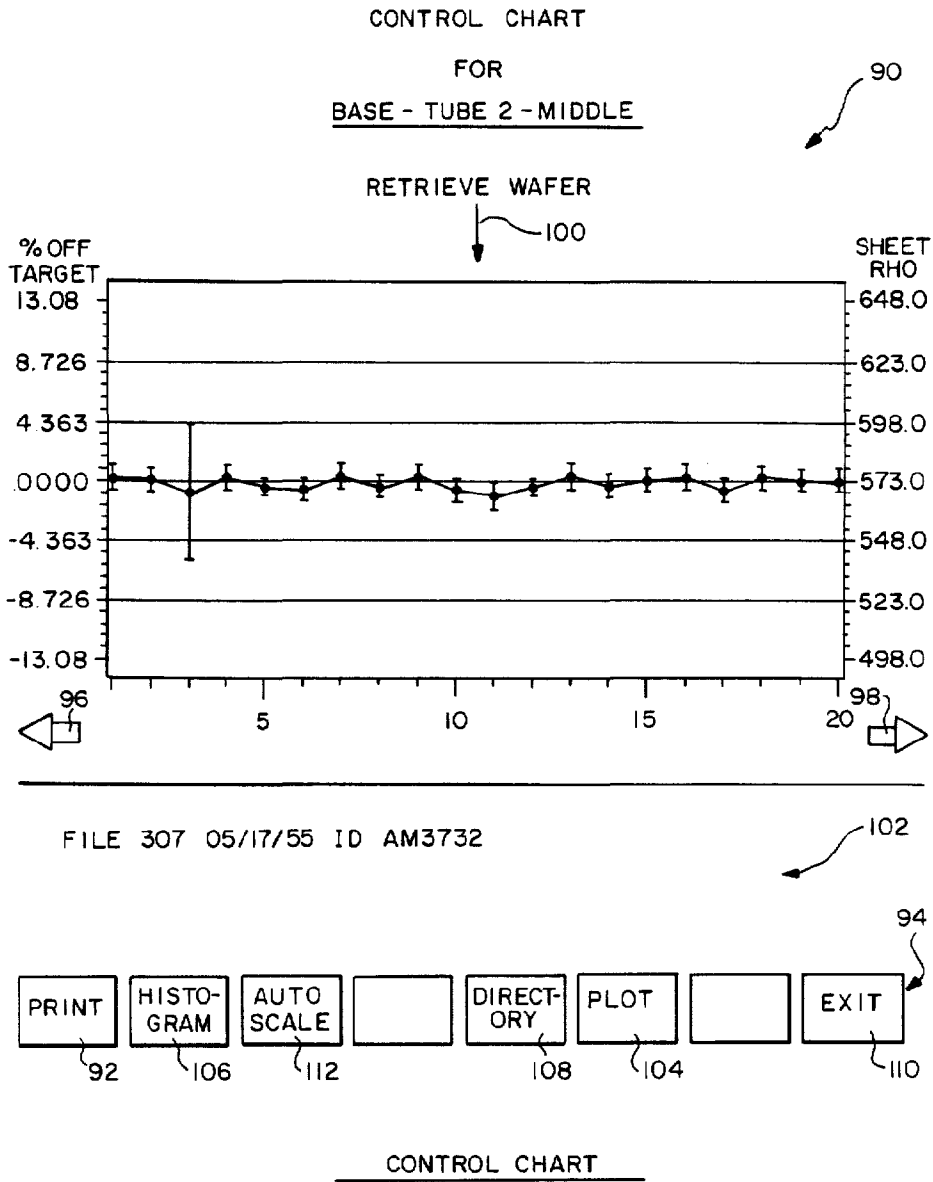


FIG. - 4

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124	122
A/NA	NAME: CABINET 1
A/NA	NAME: CABINET 2
A/NA	NAME: CABINET 3
A/NA	NAME: CABINET 9
	120

**FIG.—6a**

134	132
A/NA	NAME: DRAWER 1
A/NA	NAME: DRAWER 2
A/NA	NAME: DRAWER 3
A NA	NAME: DRAWER 81
	130

**FIG.—6b**

144	142
A/NA	NAME: FOLDER 1
A/NA	NAME: FOLDER 2
A/NA	NAME: FOLDER 3
A/NA	NAME: FOLDER 729
	140

**FIG.—6c**

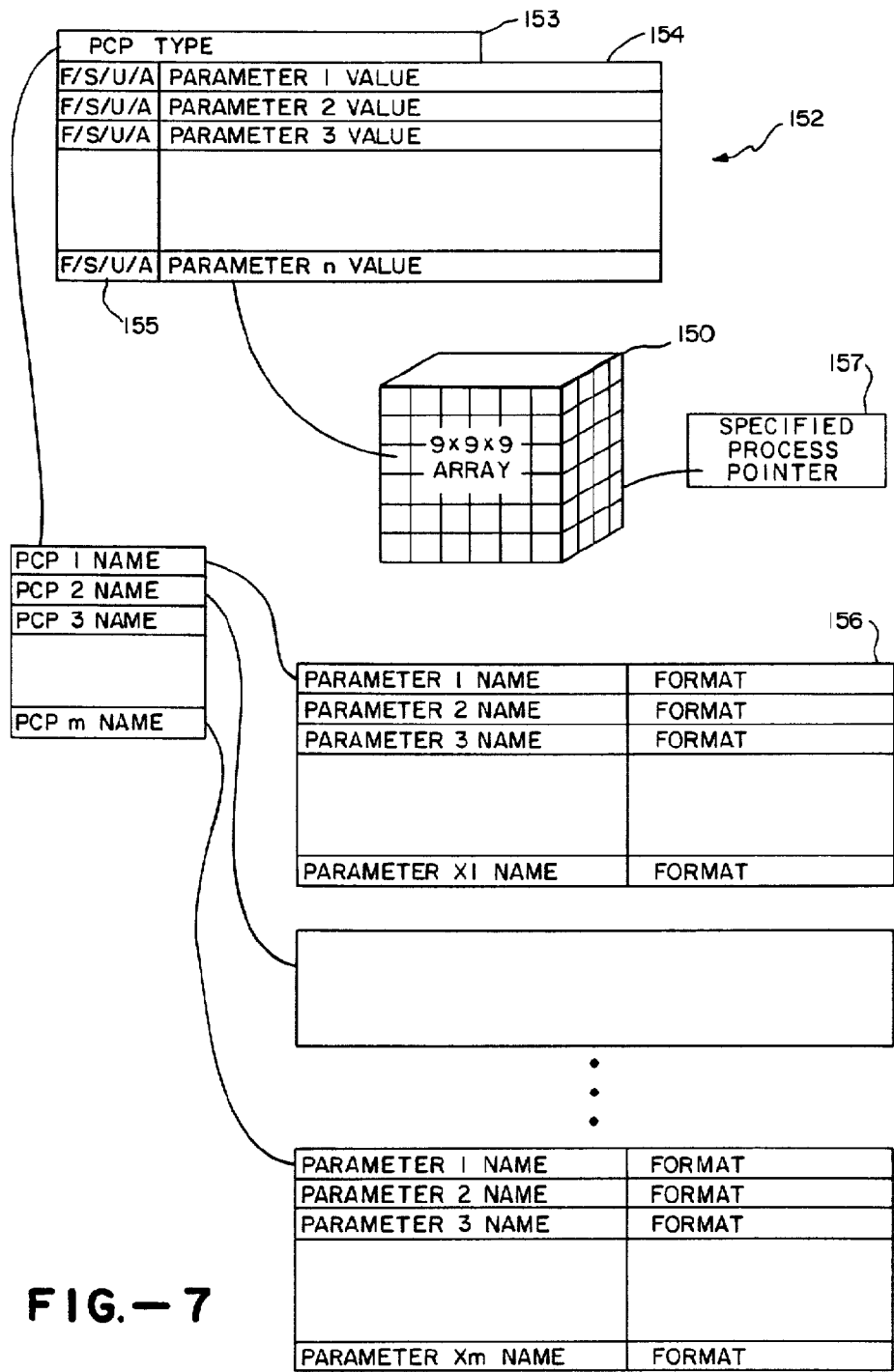


FIG. - 7

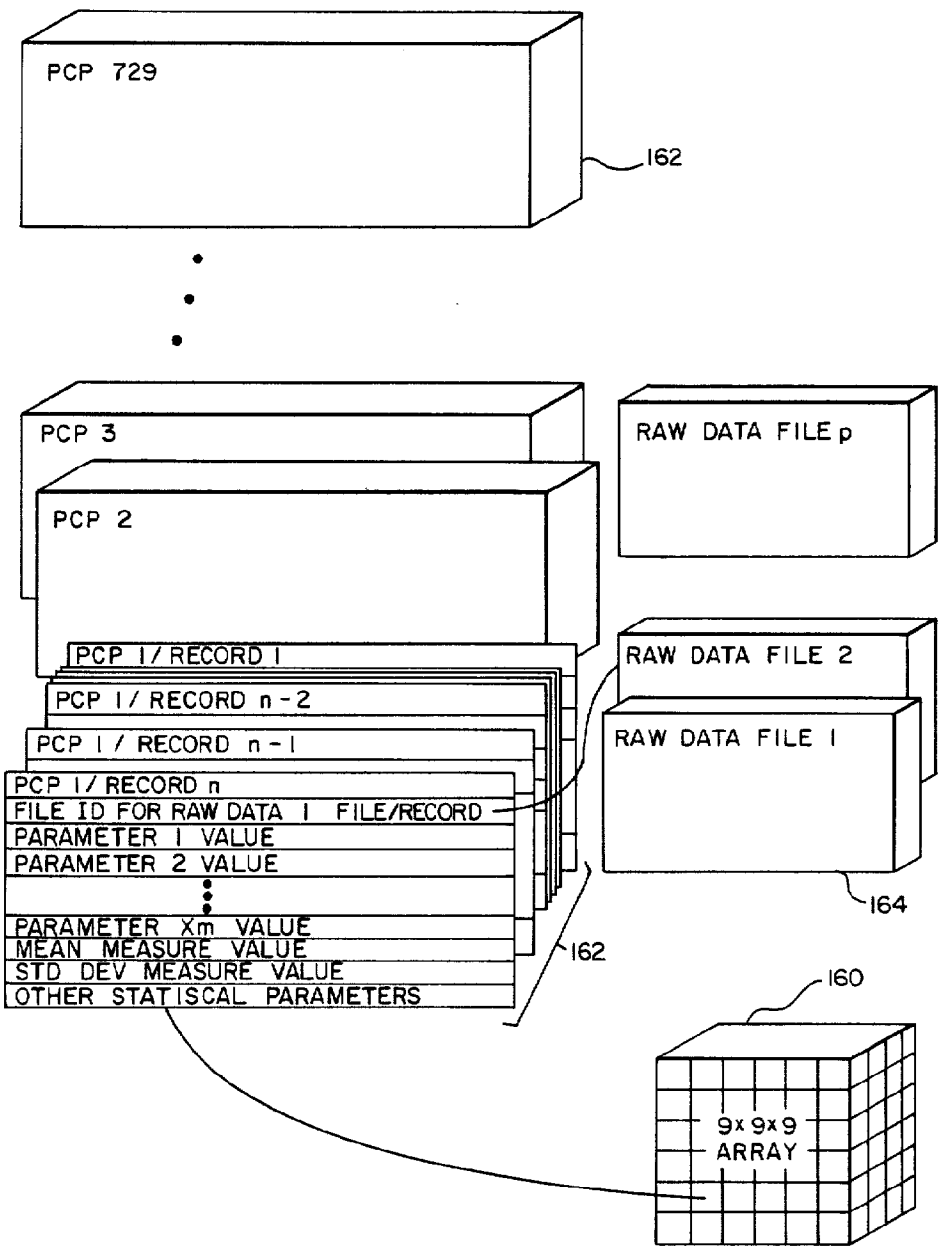


FIG. - 8

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# **MULTI-LEVEL DYNAMIC MENU WHICH SUPPRESSES DISPLAY OF ITEMS PREVIOUSLY DESIGNATED AS NON-SELECTABLE**

This application a divisional of application Ser. No. 06/864,024, filed May 16, 1986, U.S. Pat. No. 4,805,089 entitled PROCESS CONTROL INTERFACE SYSTEM FOR MANAGING MEASUREMENT DATA, which is a continuation in part of patent application Ser. No. 729,153 entitled PROCESS CONTROL INTERFACE SYSTEM FOR DESIGNER AND OPERATOR, filed Apr. 30, 1985, assigned to the assignee of this invention, now U.S. Pat. No. 4,679,137. Ser. No. 729,153 is hereby incorporated herein in its entirety by reference.

This invention relates generally to systems and methods for computer control of machine processes and in particular to systems and methods for computer control which involve menu driven approaches to selection of processes including processes run by a machine and related data management processes.

## **BACKGROUND OF THE INVENTION**

### **Database Management for Industrial Process Control**

While many computer controlled machines are designed to automatically record data relevant to the performance of the machine, the analysis of this data is generally not automatic. This is especially true for machines which are used to perform a variety of different processes in an industrial environment. Furthermore, the operators who run such machines are rarely assigned to data analysis and database management tasks.

This combination of circumstances tends to cause the discovery of process control problems to be delayed until there is a noticeable degradation in the quality of the product being made or in the process being performed.

The present invention provides a system and method of database management that facilitates the performance of data management and analysis tasks by operators, rather than by the engineers who have normally performed such tasks in the past. In particular, the present invention employs the same easy to use menu driven selection method for selecting a process to be run and for requesting an analysis of the data collected from previous runs of the selected process. At the push of just one or two buttons by the operator, the system of the present invention automatically sorts through the measurement data stored in the system and performs a specified data management task (such as printing a trend chart) on previously recorded data for the process specified by the operator.

As a result, the operator can initiate a data management task either just before or just after running a selected process, using the same menus as he uses for selecting and running the selected process.

### **Importance of Sheet Resistance Mapping of Semiconductor Wafers**

The invention described in this specification may be applied generally in computer controlled machines which perform various production or testing processes. It may also be applied to data collection and data base management programs. However, the detailed description of the invention will be given in terms of the control of an automated resistivity tester for performing sheet resistance mapping of semiconductor wafers. This

equipment is used to characterize the performance of semiconductor wafer manufacturing equipment utilized to form surface layers of specific target conductivity value as part of the process of manufacturing semiconductor devices such as, for example, large scale integrated circuits.

The preferred version of an automated resistivity tester to be controlled by this invention is disclosed in co-pending and commonly assigned U.S. patent application Ser. No. 726,498, filed on Apr. 24, 1985, now U.S. Pat. No. 4,679,137, and entitled "PROCESS CONTROL INTERFACE SYSTEM FOR DESIGNER AND OPERATOR." This disclosure is specifically incorporated herein by reference. The use of computer controlled testing apparatus of this type as the background environment for demonstrating the advantages of this invention is especially meaningful because of the importance of the semiconductor industry to the advancement of science and technology in many areas, including areas of factory automation to which this invention may be very meaningfully applied. To understand the overall importance of automated resistivity testing to the semiconductor industry, reference is made to the helpful background information given in the above-identified copending application on the status of the industry and the particular importance of performing automated resistivity testing on semiconductor wafers which have been subjected to ion implantation.

The correctness and uniformity of implant dosage across a semiconductor wafer can be determined in an automatic sheet resistance mapping system which has the capability of taking multiple test readings in both a contour map and diameter scan mode. From these tests and printouts, the engineer in charge of a process can determine whether the ion implantation equipment is operating properly.

In a co-pending and commonly assigned patent application entitled "Apparatus and Methods for Resistivity Testing," Ser. No. 704,296, filed Feb. 22, 1985, now U.S. Pat. No. 4,703,252, a novel arrangement for orienting the resistivity test probe for improved accuracy in performing four-point probe sheet resistance measurements on conductive surface layers of a semiconductor wafer is disclosed. The specification of that application is hereby incorporated by specific reference.

To encourage the use of testing equipment such as automated resistivity testers, it is important to provide an overall computer control program for the tester which is easy for the engineer to set up to perform in-process monitoring measurements which will provide meaningful data. It is also important for the control program to be simple for the operator to run with confidence and consistency to produce meaningful data. Engineer and operator convenience and confidence are the keys to increasing acceptance of automated process control and testing in all industries.

### **Prior Art Computer Control Methods**

It has become a standard approach in the art to use a programmed digital computer to control the operation of various types of machinery which have the capability to perform a variety of tasks or the capability to perform the same task in a variety of ways.

Computer control of industrial machines generally involves a complex set of processes and a large number of parameters which must be entered for the machine to carry out a selected process. Because of this complexity,

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the set up of the machine for performing a desired process meaningfully is usually done by an engineer who understands the overall functioning of the system and the interaction of the process parameters with the process control programs of the machine. In the better designed systems, this engineering set up is facilitated by a machine control program which provides the engineer with a sequence of different menus or prompts which direct process selection and parameter entry. These menus or prompts are typically presented individually and in sequence. In situations requiring a substantial number of menu screens, process or parameter value choices on one screen may be affected by earlier or later choices several screens away. Thus the engineering set up operation may require continuous paging back and forth between screens to check on processes selected or parameters previously entered so that overall meaningful and consistent process selection and parameter entry can be achieved at each screen level.

The complexity and inconvenience of the engineering set up protocol of most computer controlled machines tends to discourage their use except by the more sophisticated engineers at the most sophisticated companies. Even when these systems are used, the requirement to provide written operator instructions introduces a frustration that tends to discourage widespread use of the technology to achieve the benefits it could produce.

#### SUMMARY OF THE INVENTION

In summary, the present invention is a system and method for computer control of machine processes. A dynamic menu feature is used in the selection of processes, data management tasks, and the definition and selection of operating parameters used by a process control program to direct the performance of the process by the machine.

The system and method of this invention incorporates the feature of providing a set of predefined data management or data analysis tasks which the operator of the system can use when using the system to run a selected process. The same menus used for selecting a process to run are used for initiating data management tasks.

Measurement data structures for storing data measured during the running of processes, and related data, for a multiplicity of processes are defined and stored. Data is added to these data structures each time a process is run, and this data is automatically accessed when the operator requests data analysis on the data collected during previous uses of a selected process.

Access to measurement data for detailed data management tasks is provided not only through the dynamic menu feature, but also graphically through the use of control charts. These charts depict trends in the measurement data for selected processes. By pointing at any data point in the chart, the user can access the corresponding record of data for detailed data analysis or for use in a data management task.

#### BRIEF DESCRIPTION OF THE DRAWINGS

Additional objects and features of the invention will be more readily apparent from the following detailed description and appended claims when taken in conjunction with the drawings, in which:

FIG. 1 is a block diagram of a process control system in accordance with the present invention.

FIG. 2 is a flow chart of the dynamic menu aspect of the present invention.

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FIG. 3 is a contour map.

FIG. 4 is a three dimensional wafer resistivity map generated by a resistivity contour map program in the preferred embodiment.

FIG. 5 is a trend plot for a single selected process which was generated by the preferred embodiment of the present invention.

FIGS. 6a-c depict the process name data structures used for storing process names.

FIG. 7 depicts the parameter data structure used to define processes in the preferred embodiment.

FIG. 8 depicts the data structure used for storing measurement data and related information.

#### DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to FIG. 1, there is shown a block diagram of a system 20 incorporating the apparatus of this invention and capable of carrying out the method of this invention. A physical processing system 22, such as a semiconductor wafer resistivity tester, is controlled by a computer based control system 24. The control system 24, in accordance with this invention, includes an engineering set up module 26 and an operator module 28. The control system 24 further includes a set of process control programs 30, each of which is used to control the physical system 22 while it is performing a specified type of process.

The control system 24 includes a computer central process unit (CPU) 32, a keyboard 34 or equivalent device for entering commands and data into the system 24, a display device 36 such as a color monitor with a touch sensitive screen, and a printer 38. A removable 10 megabyte hard disc cartridge is used to store data structures 42 which define the process parameters used in the processes performed by the physical system 22; it is also used to store the measurement data generated by the physical system 22 during operation and measurement derived data generated by the CPU 32 such as mean values and standard deviations.

As will be explained in greater detail below (and as explained in copending application Ser. No., 729,153, now U.S. Pat. No. 4,679,137), the engineering module 26 is a set up control program (called the engineering set up control program) which is used by engineers to define the degree and types of restraints which limit and control the types of processes which can be run using the physical system 22. In the preferred embodiment, the computer used is a Hewlett Packard Vectra.

The engineering module furthermore includes means for storing a representation of the set of decisions made by the person using the engineering set up program on a portable magnetic disc 40. These choices are represented by entries in a set of data structures 42 which are used by both the engineering set up and process control programs.

The operator module 28 is an operator process control program used by an operator (i.e., a person) to select and run processes on the physical system 22 which have been previously set up using the engineering set up module 26.

As will be described in greater detail, below, the operator process control program 28 includes a process selection program for selecting which of the available processes is to be run on the physical system 22, a parameter entry program for specifying parametric values for use in conjunction with the process to be run by the physical system 22, and a data analysis or data manage-

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ment program for analyzing the measurement data collected by the control system 24 from the physical system 22.

In the preferred embodiment, the same computer can be used for engineering set up, process control, and data management. On the other hand, an engineer can use one computer to set up the processes he wants the operator to run, and can then hand the operator the disc 40 for use on a separate computer control system 24. Operators are denied access to the engineering module 26 by requiring knowledge of a password to use the engineering module 26.

In the preferred embodiment the physical system 22 is a wafer resistivity tester and there are three process control programs 30. One process control program, called Contour Map, causes the computer 36 in the operator module to send control signals to the tester 22 which direct it to measure and record the resistivity of a semiconductor wafer at a specified number of separate position coordinates on the wafer. Another process control program, called Diameter Scan, generates control command which direct the tester 22 to measure and record the resistivity of a semiconductor wafer at a specified number of separate test sites along a diameter line. A third, called Quick Check, measures the resistivity of a semiconductor at a small number of test sites to quickly determine the approximate resistivity of a semiconductor wafer.

#### Dynamic Menu Selection Method

The exemplary menu display shown in Table 1 is used in the preferred embodiment to select one item from a set of items. The items are organized into groups and subgroups, each of which has an assigned name. For the purposes of this example, the items are resistivity test processes which can be performed by a resistivity tester 22 under the control of a computer 24.

Three menu display regions are defined on the display screen: a group menu, a subgroup menu, and an object menu. A fourth display region at the bottom of the display is used to identify the tasks which can be performed. Some of the tasks will use the item pointed to in the third menu region.

Conceptually, it is helpful to picture the items listed in the menus as a set of folders which are organized in drawers and cabinets. In the preferred embodiment, each cabinet (i.e., each main menu item) contains up to nine drawers, and each drawer (i.e., each second menu item) contains up to nine folders. In other embodiments, the number of items under any menu could be unlimited, with the menus acting as windows which scroll up and down over the complete list of items in the menu.

There is a pointer associated with each menu region and also with the task selection region. The current position of each pointer is indicated by displaying the item in brighter video (shown in Table 1 as an asterisk "\*" next to the selected menu position, except for the active pointer, as explained below) than the other items.

The subgroups shown in the second menu region are the subgroups which are associated with the group being pointed to in the first menu region. The items shown in the third menu are the items associated with the subgroup being pointed to in the second menu region.

Only one of the position pointers is active at any one time. The active pointer is shown by displaying the title of the corresponding menu in reverse video (shown in Table 1 with an asterisk "\*" next to the title) and by

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displaying the item being pointed to by the active pointer in bright reverse video (shown in Table 1 by an arrow pointing to the item in bright reverse video).

In the preferred embodiment, the display 36 is a touch sensitive display, and the keyboard 34 contains standard up, down, left and right cursor keys.

The active pointer can be moved either by using the keyboard's cursor keys or by touching the appropriate portion of the display's screen. The active pointer can be moved from one menu to another by using either the left and right cursor movement keys on the keyboard 34, or by touching the screen in the vicinity of the menu to which the user wants to activate the pointer. Similarly, the active pointer can be moved up and down the list of items in any one menu by using the up and down cursor keys, or by touching the screen in the vicinity of the item the user wants the active pointer to point to.

When the menus are first displayed, they begin with the active pointer pointing at the first group name, and with the other pointers pointing to the first item in each menu.

As shown in Table 2, when the pointer in the cabinet menu region is moved, for instance, to point to the item labelled "EPI" in the menu, the drawer menu is automatically replaced with subgroup items associated with the group item being pointed to in the first (cabinet) menu region. Similarly, the third menu region is replaced with names associated with the new subgroup item being pointed to in the drawer menu display region.

Table 3 shows the display after the active pointer has been moved from its position in Table 2 to the second display region and has been moved down to the fifth item in the subgroup menu (labelled "REACTOR 1—SPECIAL"). Note that the items displayed in the folder menu have been automatically updated to correspond to the item being pointed at in the drawer menu.

Referring back to Table 1, the tasks displayed along the bottom of the display are invoked by touching the appropriate box on the display screen. For example, touching the "COLLECT NEW DATA" box will cause the control system 24 to perform the resistivity measurement process corresponding to the item pointed to in the folder menu. If that process is a contour map process, the system 20 will measure the resistivity of a semiconductor wafer at a number of different points and will generate a resistivity contour map such as the maps shown in FIGS. 2 and 3.

Touching the "CONTROL CHART" box in Table 1 will cause the system to generate a control or trend chart showing the mean and standard deviation of the resistivity values during a preselected number of previous runs of the process pointed to in the folder menu. An example of such a control chart is shown in FIG. 4.

Another task provided by the preferred embodiment is the selection of several processes to be used together in a data management or data analysis task. To accomplish this, the "SINGLE" box is touched. The system responds by displaying changing the text in that box to "MULTIPLE" and changing the left most box to say "SELECT", as shown in Table 4. Then, the user can select items by manipulating the menu pointers until the folder pointer points to an item to be selected, and then touching the "SELECT" box. Each selected item is displayed in reverse video (shown in Table 4 as having an asterisk to the right of the selected item). An item can be deselected by pointing the folder pointer at the selected item and then touching the "SELECT" box.

After the user has selected all the items which he wants to use, the user can then initiate one of the other tasks, such as the "CONTROL CHART" task, which causes the system to perform the selected task on all of the selected items. For instance, if the "CONTROL CHART" task is selected, then a control chart with plots for each of the selected processes will be generated.

Referring to FIG. 5, the basic menu selection method works as follows. First, at least two menu display regions are defined and two menus are displayed with predefined initial pointer positions (box 50). For instance, in the dynamic menu example shown in Table 1 there is a first menu display region entitled CABINET and a second menu display region entitled DRAWER. Each display region has a pointer, the position of which is indicated in Table 1 by an asterisk or arrow. The items being pointed at by the display region pointers are visually distinguished (e.g., by highlighting, use of bright video or use of reverse video) from the other items in the menus so that the user will know the current position of these pointers.

Up and down cursor keys (see process flow paths 52 and 54) are used to move the main menu pointer, which automatically causes the second menu to be replaced with items corresponding to the main menu item currently being pointed at (box 56). See for example the transition from Table 1 to Table 2. Process flow path 54 represents successive movements of the main menu pointer.

Successive uses of the left and right cursor keys (process flow paths 58-64) activate the second menu pointer (box 66) and then the main menu pointer (box 68). Each such movement of the active pointer from one menu display region to another is visually confirmed by highlighting the title of the display region with the active pointer. In some, but not all, uses of the dynamic menu in the preferred embodiment the active pointer is further distinguished by showing the item being pointed at by active pointer in bright reverse video while the items being pointed at by the other display region pointers are shown in bright (but not reverse) video. The activation of the second menu pointer in Table 3 is shown by the movement of the asterisk from the title of the CABINET menu (in Table 2) to the title of the DRAWER menu (in Table 3). From the screen shown in Table 3, use of the left cursor would activate the first menu pointer and deactivate the second menu pointer.

When the second menu pointer is active, up and down cursor keys (process flow paths 70 and 72) are used to move the second menu pointer (box 74). Thus, the screen shown in Table 3 was achieved by activating the second menu pointer and then using the down cursor key four times to move the pointer down to the fifth item in the second menu display region.

At any time, a designated task can be performed (usually with reference to either the item pointed to by the active pointer or by the second menu pointer) by sending an appropriate signal to the computer (see box 76 and process flow paths 78 and 80). For instance, pressing the COLLECT NEW DATA box on the screen shown in TABLE 1 causes the system to use the process labelled BASE-TUBE2-MIDDLE to collect resistivity data from a semiconductor wafer in the resistivity tester 22.

## Operator Control Program

When the system 20 is first turned on, it displays the lead-in screen shown in Table 5 below. The lead-in screen simply identifies the software program, displays a copyright notice and a warning concerning the proprietary rights in the system. The operator control program is loaded and started when the operator touches the TEST box on the command line at the bottom of the screen.

The operator assigned to carry out some resistivity testing operations on one or more wafers has, in the preferred embodiment, an operator-related disc 40 on which an engineer has caused to be stored all of the parameter data structures for a multiplicity of processes. The operator inserts this disk in the system 20, touches the TEST box on the touch screen, and the system loads the stored data structures from the disk into internal memory of the computer.

## Process Selection

After the operator touches the lead in screen, the menu in Table 1 (which was described above) is displayed on the touch screen. In the preferred embodiment, processes not available for use by the operator are simply not shown in the process selection menu. The operator knows from prior instruction that the system will not allow him to select a menu item which contains no text.

The operator knows from the traveler, a process instruction sheet which accompanies the wafer(s) to be tested, which manufacturing process the wafer just underwent, which tube it was processed in, and whether the wafer was at the load end, middle or source of the tube. For this example we will assume the wafer just underwent an epitaxial deposition in the load end of Reactor 1 (i.e., a particular piece of semiconductor manufacturing equipment). As described above, the operator moves the menu pointers until the folder menu pointer points to the EPI-REACTOR 1-SPECIAL-LOAD END folder item (in Table 3).

At this point the operator can perform any of the tasks displayed at the bottom of Table 1. We will assume that he touches the "COLLECT DATA" box. The system responds by displaying the screen shown in Table 6.

## Parameter Entry

The screens in Tables 6 and 7 are for parameter entry by the operator. It includes a top prompt line which identifies the process selected by the operator (in this case, EPI-REACTOR 1-SPECIAL-LOAD END) which will be invoked when the selected process is actually run.

Under the top prompt line is a header block which has configured by the engineer to have a fixed heading followed by two forced entry parameters: OPERATOR and SHIFT.

The OPERATOR and SHIFT parameters are "single" time forced entry parameters" that the operator must enter a value for once each time the process is selected, but need not reenter if the selected process is used multiple times. The portions of the parameter entry screen having "single time forced entry parameters" are colored yellow (designated by an "S" for "single forced" next to the area in the Table).

Parameters which require entry of a value by the operator every time the process is used, called "forced

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entry parameters", are highlighted with a red background (designated by an "F" for "forced" next to the area in the Table).

Parameters which are operator alterable, but not forced entry parameters, are highlighted with a blue background (designated by an "A" in the Table). Parameters with fixed values are shown in normal video with a black background (designated by a "U" for "unalterable" next to the item in the Table).

Thus the parameter entry screen is color coded to help the operator determine what information must be entered, and what information can optionally be entered, before the selected process is run.

It should be understood that OPERATOR and SHIFT are not process related parameters, but are data parameters which the engineer, in his discretion, has decided to track and thus to force the operator to enter before the process has been run. Only process control parameters are used by the process control program to determine what commands are to be sent to the tester 22. Another type of parameter, called an analysis control parameter, is used to control the analysis performed by the process control program on the data collected while the process is run.

As shown in Table 6, the labels OPERATOR and SHIFT are actually unalterable parameters designated by the engineer who set up this process, and the boxes to the right of these labels are the locations of the corresponding forced entry parameters.

The two forced entry parameters are followed by an operator alterable parameter line which the engineer has left undesignated, but may have requested the operator in written instructions to enter certain data tracking parameters under certain circumstances. The operator will type in on the keyboard, the OPERATOR and SHIFT parameters in sequence, entering each by depressing the cursor down arrow on the keyboard to reposition the pointer (shown as an arrow) to the next parameter field. The pointer will usually have an initial position at the first parameter which must be entered by the operator and this feature is part of the operator control program software.

After the operator has entered OPERATOR and SHIFT, the operator can move the cursor or pointer down to the next parameter entry area of the screen by using the cursor down key. This area displays four data parameters. Of these, only the WAFER ID parameter is a forced entry parameter which must be given a value every time the process is used; the others are operator alterable parameters for which the operator can enter a value when appropriate.

When the operator is done entering values on the screen shown in Table 6, he moves onto the next screen shown in Table 7 by touching the CONTINUE box in the command line.

At any time while using the screens shown in Tables 6 and 7, the operator can abort the parameter entry process and return to the process selection screen shown in Table 3 by touching the EXIT box in the command line.

Referring to Table 7, the operator is now asked to provide values for several process parameters (NUMBER OF SITES, WAFER DIAMETER, TEST DIAMETER, AUTO SAVE, and CURRENT) and analysis control parameters (% INTERVAL, SORT SIGMA, CAL CURVE, TARGET, CONTROL and WARNING).

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The engineer has previously denoted the NUMBER OF SITES and WAFER DIAMETER parameters to be operator unalterable parameters, probably on the basis that the engineer has determined that he always wants 121 sites measured and the wafers will always be 100 millimeter wafers. The operator knows that they are fixed because they are displayed with a black background (designated in Table 6 by a "U" next to the unalterable items) and furthermore the cursor or pointer cannot be positioned on that item.

There is no need to allow the operator to alter these parameters and there is good reason not to have the operator enter these parameters at all since a mistake could be very costly in terms of improper test results which might allow wafers with improperly doped or improperly deposited epitaxial layers to undergo further processing without the problem being detected until after the circuit on the wafer were completed. In many prior art systems, the operator would have to enter these parameters from an engineer instruction sheet and an entry error could occur. Here the engineer has fixed the parameter values as the correct ones to use.

As explained above, the operator alterable parameters are designated with an "A" in Tables 6 and 7, and the operator has discretion, within the instructions from the engineer, to alter these parameters in certain test situations. Another operator having a different disk with different data structures thereon may, for example, have different alterable parameters, either fewer or more.

When using the screen in Table 7, the operator will find a box labelled "LOAD WAFER" once he has entered values for all of the forced entry parameters in the screens shown in Tables 6 and 7. This signifies to the operator that all forced entry parameters have been entered and the system is prepared to run the selected process on the wafer.

The operator can still change any of the alterable parameters, including forced entry parameters if necessary. If the operator needs to go back to the screen shown in Table 6 to alter one or more of the values in that screen before proceeding with running the test, he can touch the PREVIOUS box in the command line to go back to the previous parameter entry screen.

Once all parameters are correct, the operator touches the LOAD WAFER box (as shown in Table 7) and the process is run by the tester under computer control without further action by the operator. The operator will be prompted by the system to load a wafer on the wafer test platform of the system. After the operator confirms that a wafer has been placed on the wafer test platform, the tester system will take over and perform the process invoked by the operator. If the invoked process is a contour map process, the system will generate a contour map such as the one shown in FIG. 2, and the measurement data will be stored on the operator's disc 40.

When the tester is finished, the wafer platform will present the wafer back to the operator, and the screen in Table 7 will reappear with the second box of the command line displaying NEXT WAFER. The operator can rerun the same test by touching NEXT WAFER, or can touch EXIT to go back to the process selection menu to select another process.

If the operator uses NEXT WAFER, the parameter entry screen in Table 6 is displayed with all the parameter entries from the previous run left unchanged—except that the forced entry parameters (denoted with an

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"F" in the Table) are now blank and require new values. The parameters denoted with an "S" in the Table need not be changed—entry of a value is forced only the first time the process is used. However, if the operator returns to the process selection screen e.g., Table 4) before rerunning the process, the system will require entry of all forced (i.e., forces and single forced) parameters. After the operator has entered all the necessary parameter values in both parameter entry screens, the selected process can be rerun, as described above, by loading a new wafer onto the wafer platform and touching the LOAD WAFER box in the command line.

From this explanation, it will be appreciated that the operator control program is very easy for the operator to use with confidence. Assuming that, in configuring the various processes of the system, the engineer has employed process group titles and process names which are meaningful to the trained operator or are otherwise provided on documentation which the operator automatically has in his possession, the process selection step by the operator is greatly facilitated. Furthermore, the system automatically communicates to the operator the status of each parameter. With the already entered default values and fixed parameters, the operator has only to enter those forced entry parameters and make any changes in the operator alterable parameter values which the engineer has instructed or which the traveler accompanying the wafer to be tested signifies.

#### Data Management Tasks

Referring to Table 1, the operator can initiate data analysis instead of data collection simply by touching the CONTROL CHART or HISTOGRAM PLOT boxes instead of the COLLECT NEW DATA box.

When the CONTROL CHART box is used, the system 20 automatically generates a control chart like the one shown in FIG. 4. This chart 90 plots the mean measured resistivity value and a two standard deviation range of the measurements about the mean value for a preselected number of previous uses of the selected process.

The "selected process" is simply the process being pointed at in the folder menu. The number of previous uses which are included on the control chart is selected by the engineer who set up the operator's disc 40. The engineer can specify either that (1) the last X runs be plotted, or (2) the runs from the last X days be plotted, where X is a number between seven and thirty.

Viewing this control chart on the system's display 36, the operator can easily determine if the measured resistivities are close to target or are moving away from the target. This makes it easy to see trends which might be hard to detect from inspection of the raw measurement data.

To further aid the operator interpret the control chart, in one embodiment of the invention the control chart is divided into three zones: an inner zone which is highlighted with a green background; a middle zone above and below the inner zone, which has a yellow background; and an outer zone above and below the middle zone, which has a red background. The middle of the inner zone is the target resistivity value specified by the set up engineer, and the boundaries of the bands are also specified by the set up engineer so that data points in the green zone represent acceptable resistivity values, data points in the yellow zone represent wafers with questionable resistivity, and data points in the red zone represent wafers with unacceptable resistivities.

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If the operator thinks that the engineer should see the control chart it can be printed by touching the PRINT box 92 on the command line 94. If the operator thinks that the data point for a particular wafer is unusual and warrants further attention, he can use the left and right arrows 96 and 98 to move the RETRIEVE WAFER pointer 100 until it points at the offending datum. The identity of the datum being pointed at by pointer 100 is displayed on prompt line 102. Touching the PLOT box 104 causes the system to generate a plot of all the measurement data for the identified wafer. The type of plot generated will depend on the type of process used to measure the data. If a contour map process was used, then a plot similar to the plots in either FIG. 2 or 3 will be generated.

Still referring to FIG. 4, the preferred embodiment's control chart includes an autoscaling feature. Normally, when setting up the process definition, the engineer specifies the scaling for the control chart. If the engineer has not specified the control chart scaling, the chart will be automatically scaled by the operator module's software; otherwise the control chart 90 generated when the operator uses the CONTROL CHART task will use the scaling specified by the engineer.

As will be understood by those skilled in the art, the engineer's preset scaling may turn out to overly compress or overly expand the control chart, rendering it useless or difficult to use. Therefore, even if the engineer has specified a control chart scale, the operator is given the ability to select autoscaling, which will automatically scale the data so that it can be usefully interpreted.

In particular, if the engineer has specified the control chart scaling, the operator can toggle between the engineer's preset scaling and the autoscaling by touching the AUTO SCALE box 112 in the command line. This box 112 will say AUTO SCALE when the engineer's preset scaling is being used, and will say PRESET SCALE when the autoscale facility is being used, thereby allowing the operator to select between the two control chart scaling modes.

In another variation of this invention, in a line just above the plot in the control chart and just below the RETRIEVE WAFER arrow 100 there is added a color coded (i.e., red, yellow, or green) line of dots, one above each data point, to indicate whether the status of the data point. This helps the operator quickly determine if any of the data points require further investigation and also helps him line up the RETRIEVE wafer arrow with those data points.

If the HISTOGRAM box 106 is used then a histogram for all the data for the selected folder (identified at the top of the chart 90) will be generated using certain statistical parameters which are generated and stored each time a process is run.

Touching the DIRECTORY box 108 causes the system to display a list which identifies all the data stored from previous runs of the selected process. From this list the operator can choose one or more runs for individual plots.

The EXIT box 110 is used to get back to the screen shown in Table 1.

#### Multiple Process Data Analysis

Referring to Table 1, touching the SINGLE box causes the system to switch modes so as to enable data analysis on more than one folder (i.e., process) at a time. The resulting screen is shown in Table 4.

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As shown in Table 4, the box on the command line which formerly read "SINGLE" now reads "MULTIPLE". This is displayed in reverse video (not shown in Table 4) so as to warn the operator that the system is in multiple plot mode. The system can be returned to its normal operating mode by touching the MULTIPLE box, which returns the system to the display shown in Table 1. Note that command line in Table 4 contains only data management tasks, the MULTIPLE box, and EXIT for exiting back to the lead-in screen.

To select each of the multiple folders (i.e., processes) for data analysis, the operator simply moves the menu pointers until the folder pointer points at the process to be selected, and then touches the SELECT box. Selected processes are displayed in reverse video—shown with an asterisk to the right of the item in Table 4. A selected process can be deselected by touching the SELECT box a second time while the folder pointer points at the selected process. While Table 4 shows three folders selected from a single drawer (subgroup), any combination of processes can be selected from the different cabinet and drawer menus for use in the multiple process data analysis.

After all the processes have been selected, the operator initiates the generation of a control chart or histogram by touching the corresponding box in the command line. The control chart will simply be a single chart containing plots similar to the one shown in FIG. 4 for each of the selected processes.

The histogram plot for multiple processes simply combines the data for all of the selected processes. This may be useful where a combined statistical analysis of several processes is more meaningful than the statistical analysis of any single folder.

#### Miscellaneous Operator Tasks

Referring to Table 1, the MESSAGE box on the command line is used by the operator to retrieve messages left by the engineer. More specifically, the engineer can leave messages attached to each of the processes. For example, the engineer could leave instructions on how to set up certain tests. These messages are stored on the disc 40 along with the other data structures used to control the system and to store data. Whenever the folder menu pointer points to a process with a message, the MESSAGE box is displayed in reverse video so that the operator knows there is a message for him to read. Touching the MESSAGE box causes the message to be displayed.

Touching the DIRECTORY LISTING box causes the system to display a list of all the data stored from previous runs of the selected process. From this list the operator can choose one or more previous runs for individual plots (e.g., contour plots).

The EXIT box is used to get back to the lead-in screen shown in Table 5.

#### Data Structures

In the preferred embodiment data structures are defined and stored for 729 (i.e.,  $9 \times 9 \times 9$ ) predefined processes which are organized into nine supergroups and eighty-one groups of processes, where each such group contains nine processes. These data structures are initially defined by the engineering set up module 26 and then are stored on a disc 40 for later use. When the operator control module 28 is turned on, the parameter data structures (but not the measurement data struc-

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tures) are copied into the computer's memory for use by the operator control module 28.

#### Process Names and Availability Flags

For each process, process group and process supergroup there is assigned a name and an availability flag. The names are simply the names that appear in the process selection menus, such as the menus shown in Table 1. The availability flag for each process and group determines whether the process or group is available for use by the operator. The engineer defining the processes to be used can use the availability flags to deny a specific operator (i.e., the users of a specific disc 40) access to the corresponding process, group or supergroup of processes. This is useful, for example, if a certain operator is authorized only to perform tests on certain types of wafers, or if a process has not yet been debugged but the engineer wants to use it on an experimental basis with only certain more highly trained personnel.

Referring to FIG. 6a, the SuperGroup Prompt data structure 120 contains a set of nine process supergroup names 122, each up to twenty characters long, and a set of nine corresponding group availability flags 124. The supergroup names 122 show up in the cabinet menu of the operator's process selection screen, as shown, for example, in Table 1 during the process selection step described above. Each supergroup availability flag is equal to 0 if the corresponding supergroup is available for use by the operator and is equal to 1 if the supergroup is not available.

Referring to FIG. 6b, the Group Prompt data structure 130 contains a set of eighty-one process supergroup names 132, each up to twenty characters long, and a set of eighty-one corresponding group availability flags 134. The first nine group names belong to the first supergroup, the next nine group names belong to the second supergroup, and so on. The group names 132 show up in the drawer menu of the operator's process selection screen, as shown, for example, in Table 1 during the process selection step described above. Each group availability flag is equal to 0 if the corresponding group is available for use by the operator and is equal to 1 if the group is not available.

Referring to FIG. 6c, the Process Prompt data structure 140 contains a set of 729 process names 142 and a set of corresponding process availability flags 144. The first nine process names belong to the first group, the next nine process names belong to the second group, and so on. The process names 142 for a selected group show up in the folder menu of the operator's process selection screen, as shown, for example, in Table 1 during the process selection step described above. Each process availability flag is equal to 0 if the process is available for use by the operator and is equal to 1 if the process is not available.

#### Parameter Formats and Data Structures

Referring to FIG. 7, the Parameter data structure 150 is used to store the parameter values for all the predefined processes. Conceptually, the Parameter data structure 150 comprises a  $9 \times 9 \times 9$  array of process parameter data structures 152. Each process parameter data structure 152 contains an indicator 153 of the process control program associated with the process, and the default values 154, if any, of all the variable parameters associated with the process control program. The indicator 153 of the process control program acts as an

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indirect pointer from the data structure 152 to the process control program associated with the process.

Further, for each parameter the process parameter data structure contains a parameter status flag 155 which is equal to 0 if the parameter's status is **FORCED** (i.e., a forced entry parameter which must be given a value by the operator before the process can be run), 1 if the parameter's status is **MAY CHANGE** (i.e., changeable by the operator) parameter, 2 if the parameter's status is **LOCKED** (i.e., fixed in value), and 3 if the parameter's status is **SINGLE FORCED** (i.e., must be given a value of the first time the process is used).

Since each process control program will typically have different parameters associated with it, the engineering set up module includes for each process control program a data structure format 156 which specifies the names of the parameters associated with the process, the order of the parameters are to be stored in the process parameter data structures 152, and the format of each parameter.

Each parameter has a format because some may be stored simply as text, others may be stored as an integer or floating point number, and still others may be stored as a date or in another special data format.

In both the engineering set up process, and the operator control process there is a specified process pointer 157 which is used to point to the parameter and process name data structures of a specified process. This specified process is the process which is currently selected (i.e., specified) for being set up by the engineering set up process or for running by the operator control process.

#### Measurement Data Structures

Referring to FIG. 8, the Measurement data structure 160 is used to store the measurement values generated by each of the predefined processes. Conceptually, the Measurement data structure 160 comprises a  $9 \times 9 \times 9$  array of measurement data structures. Actually, for each probes there is one measurement files 162 and also a set of raw data records in another file 164. Both files contain one record for each data collection run performed using the corresponding process. Also, the records in the file 162 are kept in reverse chronological order, i.e., the most recent test results are stored in the first record, and the oldest measurement are stored in the last record of the files.

The records of the first file 162 contain the parameters used to set up and run the process (i.e., the parameter values entered by the operator and the engineer who set up the process), and data derived from the raw measurement values in file 162 including the mean resistivity value, the standard deviation of the measured values, and several other statistical parameters. Since each file 162 is associated with a particular process, the number of parameters for the process is known, and the system can directly access the statistical information at the end of each record (e.g., for generating control charts and histograms) simply by indexing into each record to the appropriate depth.

The storage of the process definition parameters in the measurement data file 162 provides automatic documentation of the data, and allows detailed data analysis of the engineer using a data base management program.

Each record in file 162 also contains a filed identifier which specifies the file and record in which the raw measurement data for the run is stored.

In the preferred embodiment, there is a separate raw measurement file 164 for each raw data record length.

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Thus the raw data for all processes which generate 121 data points (i.e., measure the resistivity of the wafer at 121 sites) are stored in one file 164, the raw data for all those which generate 225 points are stored in a second file 164, and so on. This scheme is used because it allows the use of fixed length record files, which provide fast access and are easier to set up than variable length record files.

#### Engineering Set Up Control Program

The operation of the engineering set up control program to produce the configuration of the system discussed above will now be explained. When the engineer starts the system, he is presented with the same initial lead-in screen (shown in Table 5) as the operator. Access to the engineering set up control program is obtained by touching the **SETUP** box on the command line and then entering a predefined password. At this point the parameter data structures stored on the disc 40 are loaded into the system memory. The next screen presented on the touch screen is shown in Table 8 and is called the **MAIN MENU** screen.

In accordance with the general use of color backgrounds to aid use of the system 20, in the preferred embodiment the displays used in the engineering module have a yellow background, while the displays for the operator module have a green background. This helps the engineer setting up the system to know which module 26 or 28 he is currently using.

#### Task Selection

The **MAIN MENU** uses the dynamic menu feature of this invention as described above. This screen has two menu display regions in the central area of the display where main menu items and subsidiary menu items are displayed using the dynamic menu display feature of this invention. The subsidiary menu items shown in the right hand region correspond to engineering set up tasks which are part of the group of tasks designated **TEST DEVELOPMENT** since that is the main menu item being pointed to at this time.

The **DATA MANAGEMENT** group of tasks is simply a more comprehensive set of data analysis, data editing and data manipulation routines than described above for the operator module.

The **SYSTEM GENERATION** group of tasks are used for defining the password that allows access to the engineering setup module, the system data and time, a system identifier, and several other similar functions.

The **TEST DEFINITION** group of engineering tasks is the most important one and will be described in detail. To initiate the performance of this group of tasks, the engineer touches the **SELECT** command box since the **TEST SETUP** task is generally performed first. The system responds by presenting the screen shown in Table 9, but with blank areas (or initial suggestive examples) in the three central menu display regions to be filled in by the engineer. The **CABINET**, **DRAWER**, and **FOLDER** areas are designated for supergroup, group and process names or titles, respectively.

#### Defining the Operator Prompts

Using the dynamic menu feature described above, the engineer moves the active pointer to any item in the menus which he wants to change. These items are changed as follows. New names are entered simply by pointing to the item and typing in a new name on the keyboard, followed by a carriage return to mark the end

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of the new name. The **ACTIVATE** box is used to toggle the item's status from available to not available and back. Not available items are displayed in reverse video (not shown in Table 9). When the operator uses the disc which the engineer has set up, processes and groups which are not available simply do not appear on the operator's display. Of course, if a process group is disabled, all of the individual processes in the group are automatically disabled since the operator cannot select any of the processes in that group.

All changes made by the engineer to the process name screen (Table 9) are reflected to the process name data structures 120, 130 and 140 as described above with reference to FIGS. 6a-c.

If the engineer has preplanned the names of all the groups and processes, the screen in Table 9 can be edited by entering all of the group and process names at one time. Later these can be added to, deleted or changed at will. As explained above, in the preferred embodiment the engineer can define up to 729 processes, organized into 81 groups and 9 supergroups.

The **UPDATE** box is used to store the revised process name data structure onto the disc 40.

Touching the **EXIT** box returns the engineer to the main menu screen shown in Table 8.

The **SELECT** box is used to initiate the process of defining or revising the process pointed to in the folder menu.

#### Test Definition

Once a process's or test's name has been defined, the next task is to define the process. To do this the engineer touches the **SELECT** box in the screen shown in Table 9.

As an initial matter, the engineering set up program asks the engineer to select the process control program (i.e., to select the type of test program) to be used by the process. In the preferred embodiment the choices are **CONTOUR MAP**, **DIAMETER SCAN**, and **QUICK SCAN**. The choice of the process control program determines the parameter data structure that will be associated with the process, as discussed above with respect to FIG. 7.

The next step to be performed is parameter definition. Once the process control program has been selected, the system displays the same screens (shown in Tables 6 and 7) as used by the operator for parameter entry, except that different tasks are provided in the command line.

Referring to Table 10, which parallels the operator parameter entry screen shown in Table 6, the prompt/information line at the top of the engineer's parameter definition screen indicates the particular process being set up and the name of the associated process control program so that the engineer knows what process he is working on.

The test setup screens enable two very important functions to be performed by the engineer: (1) denoting each of the parameters as having one of four types of status, namely operator unalterable (fixed value), operator alterable (common default value), forced entry (operator must enter to enable process running), and single forced entry (operator must enter first time process is used); and (2) entering fixed parameters and default values for operator alterable parameters. It should be noted that the parameter names in these screens are predefined relative to the process control program (**CONTOUR MAP** in this case) associated with the

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specific process being set up. The engineer may not alter these in this example. It should be recognized, however, that the engineering control program may be configured, if desired, to permit addition of optional data type parameters by the engineer.

To perform the test set up, the engineer positions the cursor or pointer at each item in the screen, touches **CHANGE**, and then either types in a value or toggles the item through preset choices for each parameter, using the up/down cursor control keys. For example, the **NUMBER OF SITES** parameter (see Table 7) has a fixed set of optional values which must be toggled through (e.g., by using the down cursor key, or pressing the **CHANGE** box, until the desired value is selected).

After the parameter value is set or entered, the **OPTION** box is used to toggle through the four choices of Unalterable, operator Alterable, Forced operator entry, and Single forced operator entry. These four different options are reflected on the engineers display using the same color coding as seen by the operator when entering parameter values (i.e., red for Forced entry parameters, yellow for Single forced entry parameters, blue for operator Alterable parameters, and black for fixed value operator Unalterable parameters).

It should be noted that, wherever necessary or desirable, each of the process parameters which requires entry by the operator is subjected to a validity check, such as for example, the entry of a valid date or wafer identification. The engineer could be permitted as a supplemental test set up function to establish a particular format and/or other constraint for the parameter value or date to be entered.

All changes made by the engineer to the parameter definition screens are reflected in the parameter data structures 150 as defined above with reference to FIG. 7.

After the parameters for both parameter screens (see, for example, Tables 10 and 7) have been defined, the engineer can use the **UPDATE** box to store the revised parameter data structures 150 on the disc 40.

Also, after both parameter screens have been defined, a third screen (not shown) is provided so the engineer can write a message for the operator to read before using the process and can define the number of wafer runs to be included in control charts generated by the operator. The engineer can specify either that (1) the last X runs be plotted, or (2) the runs from the last X days be plotted, where X is a number between seven and thirty. Note that the control chart warning zones discussed above (in the section on the operator control program) are defined in the parameter definition screen (see Table 7).

This test setup must be done for every one of the configured processes by selecting the process using the screen in Table 9 and then invoking the test definition function by using the **SELECT** box. While this is a time consuming task, it is one which is very easy to perform in a straightforward manner using the friendly tools which are incorporated in the engineering set up program.

#### Process Definition Duplication

Referring back to Table 8, the **DUPLICATE** set of tasks in the **TEST DEVELOPMENT** task group can be used by an engineer to greatly reduce the effort involved in setting up a large number of processes. When the **DUPLICATE** task is selected, a screen similar to the process selection screen (such as the one

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shown in Table 9) is provided, except that the tasks on the command line are: SELECT SOURCE, SELECT DESTINATION, COPY PROMPT, COPY PARAM, COPY P&P, and COPY DATA.

The SELECT SOURCE box is used to select a folder, drawer or cabinet that the user wants to copy. The SELECT DESTINATION box is used to select one or more items at the same menu level as the selected source item. Then, by using one of the copy boxes the corresponding data structures are copied from the selected source to the selected destination(s). Using the COPY PROMPT box causes the process name and availability data structures to be copied; the COPY PARAM box is used to copy the parameter data structure; the COPY P&P box is used to copy the parameter and the process name and availability data structures; and the COPY DATA box is used to copy the measurement data structures.

As will be appreciated by anyone who considers the matter, being able to copy the process name and parameter data structures greatly reduces the effort required to set up a large number of similar but somewhat different processes.

From the above discussion, it should be apparent that the system and method of this invention provides to the engineer all of the advantages discussed in the introductory section of this specification. Specifically, with respect to the use of the invention in connection with setup of an automated resistivity tester, it should be apparent that the engineer is provided with tools to easily and conveniently set up multiple test process configurations, each with individual parameter status denotation and availability denotation. The results of all of this setup effort are stored in associated data structures and not on a collection of documents which can get lost, garbled or misinterpreted.

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Furthermore, the engineer can, at will, revise any of the configured test processes by direct revision of data structure values rather than dealing with revising process instructions on paper. If the engineer wishes to maintain records of the prior configurations, these could be stored on one of the operator-related disks, but with all process groups disabled so that the disk cannot be mistakenly used by an operator. This, in itself, eliminates the "paperwork confusion" that often surrounds process revision level documentation and the mistakes that can be made by an operator who uses an obsolete version of written process instructions. If the engineer proceeds carefully with use of the tools provided by the system and method of this invention, all of the operator-related disks will only have enabled process configurations which are current and correct.

While the system and method of this invention does not avoid the time consuming task of setting up multiple test processes, once the engineer has learned to use the tools provided by the system and method of this invention, the engineering setup tasks can be performed much more efficiently and effectively. By eliminating the drudgery of maintenance of documentation and providing the convenience and confidence engendered by use of the system and method of this invention will encourage more widespread, effective use of computer controlled testing.

Alternate Embodiments

While the present invention has been described with reference to a few specific embodiments, the description is illustrative of the invention and is not to be construed as limiting the invention. Various modifications may occur to those skilled in the art without departing from the true spirit and scope of the invention as defined by the appended claims.

TABLE 1

*CABINET	DRAWER	FOLDER
SUB-COLLECTOR	TUBE 1	LOAD END
COLLECTOR	TUBE 2	MIDDLE
COLLECTOR PLUG	TUBE 3	SOURCE
EMITTER	TUBE 4	
BASE		
HIGH VALUE RESISTOR		
EPI		
SPUTTERED ALUMINUM		
PLATINUM SILICIDE		
COLLECT NEW DATA	HISTOGRAM PLOT	CONTROL CHART
	DIRECTORY LISTING	SINGLE
	MESSAGES	
		EXIT

TABLE 2

*CABINET	DRAWER	FOLDER
SUB-COLLECTOR	REACTOR 1	POSITION 1
COLLECTOR	REACTOR 2	POSITION 2
COLLECTOR PLUG	REACTOR 3	POSITION 3
EMITTER		POSITION 4
BASE	REACTOR 1 - SPECIAL	POSITION 5
HIGH VALUE RESISTOR	REACTOR 2 - SPECIAL	
EPI	REACTOR 3 - SPECIAL	
SPUTTERED ALUMINUM		
PLATINUM SILICIDE		
COLLECT NEW DATA	HISTOGRAM PLOT	CONTROL CHART
	DIRECTORY LISTING	SINGLE
	MESSAGES	
		EXIT

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TABLE 3

The diagram illustrates the layout of the 100MB disk, organized into three main sections: CABINET, \*DRAWER, and FOLDER. A large arrow points from the CABINET section to the \*DRAWER section.

**CABINET**

- SUB-COLLECTOR
- COLLECTOR
- COLLECTOR PLUG
- EMITTER
- BASE
- HIGH VALUE RESISTOR
- EPI
- SPUTTERED ALUMINUM
- PLATINUM SILICIDE

**\*DRAWER**

- REACTOR 1
- REACTOR 2
- REACTOR 3
- REACTOR 1 - SPECIAL
- REACTOR 2 - SPECIAL
- REACTOR 3 - SPECIAL

**FOLDER**

- LOAD END
- MIDDLE - 1
- MIDDLE - 2
- SOURCE

At the bottom of the diagram, a row of buttons is shown:

- COLLECT NEW DATA
- HISTOGRAM PLOT
- CONTROL CHART
- DIRECTORY LISTING
- SINGLE
- MESSAGES
- EXIT

TABLE 4

```

graph LR
    subgraph CABINET
        SC[SUB-COLLECTOR]
        C[COLLECTOR]
        CP[COLLECTOR PLUG]
        E[EMITTER]
        B[BASE]
        HVR[HIGH VALUE RESISTOR]
        EPI[EPI]
        SA[SPUTTERED ALUMINUM]
        PS[PLATINUM SILICIDE]
    end

    subgraph DRAWER
        T1[TUBE 1]
        T2[TUBE 2]
        T3[TUBE 3]
        T4[TUBE 4]
    end

    subgraph FOLDER
        LE[LOAD END]
        M[MIDDLE]
        S[SOURCE]
    end

    CABINET --> DRAWER
    DRAWER --> FOLDER
  
```

TABLE 5

TABLE 6

<b>EPI REACTOR 1 - SPECIAL LOAD END</b>	
<b>A PLATINUM SILICIDE TEST CASE 42</b>	
U OPERATOR	
U SHIFT	
A	S S A
LOT ID 07 - 7368 A	PROCESS DATE <span style="border: 1px solid black; display: inline-block; width: 100px; height: 20px;"></span> A
WAFER ID AX - <span style="border: 1px solid black; display: inline-block; width: 50px; height: 20px;"></span> F	PROCESS TIME <span style="border: 1px solid black; display: inline-block; width: 100px; height: 20px;"></span> A
<span style="border: 1px solid black; padding: 2px 10px; margin-right: 10px;">CONTINUE</span> <span style="border: 1px solid black; display: inline-block; width: 40px; height: 20px; margin-right: 10px;"></span> <span style="border: 1px solid black; display: inline-block; width: 40px; height: 20px; margin-right: 10px;"></span> <span style="border: 1px solid black; display: inline-block; width: 40px; height: 20px; margin-right: 10px;"></span> <span style="border: 1px solid black; display: inline-block; width: 40px; height: 20px; margin-right: 10px;"></span> <span style="border: 1px solid black; display: inline-block; width: 40px; height: 20px; margin-right: 10px;"></span> <span style="border: 1px solid black; display: inline-block; width: 40px; height: 20px; margin-right: 10px;"></span> <span style="border: 1px solid black; padding: 2px 10px;">EXIT</span>	

TABLE 7

EPI		REACTOR I - SPECIAL		LOAD END	
	SITES	121 SITES	U	% INTERVAL	1.00% A
55	WAFER DIA.	100 mm/3.94 in.	U		
	TEST DIA.	100 mm/3.94 in.	A		
	AUTO SAVE	NO	A		
	CURRENT	Aut 7.50 mV Man	U	TARGET	55.0 U
	SORT SIGMA	3.00	A	CONTROL	1.00% U
60	CAL CURVE	None	A	WARNING	2.00% U

PREVIOUS	LOAD WAFER						EXIT
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TABLE 8

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ENGINEERING MENU

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are denoted in said availability denoting value as being enabled for selection, together with said associated pointer positioned at one of said displayed main menu items;

displaying simultaneously in a second one of said menu display regions at least a portion of one of said groups of auxiliary menu items associated with the main menu item being pointed at in said first menu display region together with said associated pointer positioned at one of said displayed auxiliary menu items, the auxiliary menu items being dis-

TEST SETUP EDIT SELECTION

SUB-COLLECTOR	TUBE 1	LOAD END
COLLECTOR	TUBE 2	MIDDLE
COLLECTOR PLUG	TUBE 3	SOURCE
EMITTER	TUBE 4	
BASE		
HIGH VALUE RESISTOR		
EPI		
SPUTTERED ALUMINUM		
PLATINUM SILICIDE		

EPI	REACTOR 1 - SPECIAL	LOAD END
-----	---------------------	----------

A PLATINUM SILICIDE TEST CASE 42

LOT ID	07 - 7368	A	PROCESS DATE		A
WAFER ID	AX -	F	PROCESS TIME		A

What is claimed is:

1. In a method for displaying and selecting menu items on a computer display device, the steps of:
  - establishing at least three separate menu display regions on said computer display device, each being capable of displaying multiple menu items and an associated selectably positionable pointer to an individual menu item;
  - defining a plurality of separate main menu items;
  - defining a plurality of separate groups of auxiliary menu items, each group being associated with at least one of said main menu items;
  - defining a plurality of groups of tertiary menu items, each group being associated with at least one of said auxiliary menu items;
  - defining and storing for each said main menu item an availability denoting value which denotes whether said main menu item is enabled or disabled for selection; said availability denoting value also denoting whether each of said auxiliary menu items is enabled or disabled for selection;
  - displaying in a first one of said menu display regions at least a plurality of said main menu items which

played including only auxiliary menu items which are denoted by said availability denoting value as being enabled for selection;

automatically responding to a position change of said pointer in said first menu display region to point at a new main menu item by altering said second menu display region to display at least a portion of one of said groups of auxiliary menu items associated with the new main menu item being pointed at; and

displaying simultaneously in a third one of said menu display regions at least a portion of one of said groups of tertiary menu items associated with said auxiliary menu item being pointed at in said second menu display regions together with said associated pointer positioned at one of said displayed tertiary menu items;

wherein

said step of automatically responding to a position change of said pointer in said first menu display region further includes the step of simultaneously altering said third menu display region to display at

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least a portion of one of said groups of tertiary menu items associated with said second menu item being pointed at in said second display region; and said method further includes the step of automatically responding to a position change of said pointer in said second menu display region without a position change of said pointer in said first menu display region by simultaneously altering said third menu display region to display at least a portion of one of said groups of tertiary menu items associated with said new secondary menu item being pointed at in said second display region.

2. In a method for displaying and selecting menu items on a computer display device, the steps of:  
 defining a plurality of separate main menu items;  
 defining a plurality of separate groups of auxiliary menu items, each being associated with at least one of said main menu items;  
 defining a plurality of tertiary menu items, each said tertiary menu item corresponding to at least one of said auxiliary menu items;  
 defining and storing for each said main menu item an availability denoting value which denotes whether said main menu item is enabled or disabled for selection; said availability denoting value also denoting whether each of said auxiliary menu items is enabled or disabled for selection;  
 establishing at least three separate menu display regions on said computer display device, each being capable of displaying multiple menu items and an associated selectably positionable pointer to an individual menu item;  
 displaying in a first one of said menu display regions at least a plurality of said main menu items together with said associated pointer positioned at one of said displayed main menu items;  
 displaying simultaneously in a second one of said menu display regions at least a portion of one of said groups of auxiliary menu items associated with the main menu item being pointed at in said first menu display region together with said associated pointer positioned at one of said displayed auxiliary menu items;  
 automatically responding to a position change of said pointer in said first menu display region to point at a new main menu item by altering said second menu display region to display at least a portion of one of said groups of auxiliary menu items associated with the new main menu item being pointed at;  
 displaying simultaneously in said third menu display region the tertiary menu items corresponding to the auxiliary menu item being pointed at in said second menu display region, together with said associated pointer positioned at one of said displayed tertiary menu items;  
 wherein  
 said step of automatically responding to a position change of said pointer in said first menu display region further includes the step of simultaneously altering said third menu display region to display the tertiary menu items corresponding to the auxiliary menu items displayed in said second menu display region; and  
 said first and second displaying steps display only main menu items and auxiliary menu items which are denoted by said availability denoting value as being enabled for selection;

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whereby menu items and auxiliary menu items which are denoted by said availability denoting value as being disabled for selection are not displayed.

3. The method of claim 2, wherein said availability denoting value also denoting whether each of said tertiary menu items is enabled or disabled for selection; and said third displaying step displays only tertiary menu items which are denoted by said availability denoting value as being enabled for selection.

4. In a method of controlling a process using a programmed digital computer having a display device, the steps of:

- (a) establishing a set of process control programs;
- (b) defining a process selection data structure, including
  - process name denoting means for storing a specified process name for each of a multiplicity of specified processes;
  - subgroup name denoting means for storing a specified subgroup name for each of a plurality of prearranged subgroups of said processes;
  - group name denoting means for storing a specified group name for each of a plurality of prearranged groups of said subgroups of processes;
  - process availability denoting means for denoting whether the selection of each said process, subgroup of processes, and group of subgroups is enabled or disabled;
- (c) establishing an engineering set up control program for enabling interactive computer controlled performance of the steps of
  - entering into said process availability denoting means for a specified process, subgroup or a group, a value to specify whether the selection of said specified process, subgroup or group is enabled or disabled; and
- (d) establishing an operator control program for enabling interactive computer controlled performance of the step of selecting one of said specified processes by performing the steps of:
  - establishing at least three separate menu display regions on said computer display device, each being capable of displaying multiple menu items and an associated selectably positionable pointer to an individual menu item;
  - displaying in a first one of said menu display regions at least a plurality of said group names stored in said group name denoting means, together with said associated pointer positioned at one of said displayed group names;
  - displaying simultaneously in a second one of said menu display regions at least a portion of said subgroup names associated with the group name being pointed at in said first menu display region together with said associated pointer positioned at one of said displayed subgroup names;
  - automatically responding to a position change of said pointer in said first menu display region to point at a new group name by altering said second menu display region to display at least a portion of said subgroup names associated with the new group name being pointed at;
  - displaying simultaneously in said third menu display region the process names corresponding to the subgroup name being pointed at in said second menu display region, together with said associated pointer positioned at one of said displayed process names; and

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moving said pointers in said menu display regions until the pointer in said third menu display region points to the process name for the process to be selected;

wherein

said step of automatically responding to a position change of said pointer in said first menu display region further includes the step of altering said third menu display region to display the process names corresponding to the subgroup name being pointed at in said second menu display region after said second menu display region has been altered; and

said displaying steps display only group names, subgroup name and process names which are denoted in said process availability denoting means as being enabled for selection;

whereby said process selection step is limited to the processes for which said process availability denoting means denotes the process, the corresponding subgroup and the corresponding group as being enabled for selection.

5. The method of claim 4 adapted to provide different operator access to the running of said multiplicity of specified processes,

said engineering set up control program further enabling interactive computer controlled performance of the steps of

storing on each of a plurality of individual, operator-related, portable, nonvolatile storage means, said process, subgroup and group name denoting means, and said process availability denoting means; and

entering and storing process, subgroup and group names into said process, subgroup and group name denoting means;

wherein said method includes the step of reading and storing said process, subgroup and group name denoting means and said process availability denoting means from one of said operator-related, portable, nonvolatile storage means, said process, subgroup and group name denoting means and process availability denoting means thereafter being available for use by both said engineering set up control program and said operator control program;

whereby

said process availability denoting means stored on said operator-related, portable, nonvolatile storage means control the availability of each said process for use by said operator control program; and

said process, subgroup and group name denoting means and said process availability denoting means stored on each operator related, nonvolatile, storage means can be easily and quickly reconfigured by said engineering set up control program.

6. The method of claim 4, including the steps of:

(e) establishing a set of predefined parameters for each of said process control programs;

(f) defining a parameter data structure format for each of said process control programs, including parameter denoting means for denoting each of said predefined parameters as an operator unalterable parameter having a fixed value, an operator alterable parameter having a default value, a forced operator entry parameter that must be supplied with a value every time the process is run, or a single forced operator entry parameter that must be supplied with a value only the first

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time the process is run when the process is successively run more than one time; and

parameter value storing means for storing a value for each of said predefined parameters;

said engineering set up control program further enabling interactive computer controlled performance of the steps of

storing, for each of a multiplicity of specified processes, a parameter data structure in accordance with said parameter data structure format for a specified one of said process control programs; specifying one of said processes for engineering set up;

entering into said parameter denoting means in said parameter data structure for said specified process a value for each of said predefined parameters to specify it as an operator unalterable parameter, an operator alterable parameter, a forced operator entry parameter, or a single forced operator entry parameter; and

entering into the parameter value storing means in said parameter data structure for said specified process fixed values for said operator unalterable parameters and default values for said operator alterable parameters; and

said operator control program further enabling interactive computer controlled performance of the steps of:

utilizing said stored parameter data structure for a selected process, entering values for said operator alterable and forced operator entry parameters for said selected process; and

running the process control program corresponding to said selected process only after values have been entered for all the forced operator entry parameters corresponding to said selected process.

7. The method of claim 4, including the steps of:

(e) establishing a set of predefined parameters for each of said process control programs;

(f) storing, for each of a multiplicity of specified processes, a set of parameter values for said predefined parameters associated with a specified one of said process control programs;

(g) said engineering set up control program further enabling interactive computer controlled performance of the steps of:

selecting a first and second subgroup of said processes; and

copying said process name denoting means, process availability denoting means and parameters values for the processes in said first selected subgroup into said second selected subgroup.

8. The method of claim 4, including the steps of:

(e) establishing a set of predefined parameters for each of said process control programs;

(f) storing, for each of a multiplicity of specified processes, a set of parameter values for said predefined parameters associated with a specified one of said process control programs;

(g) said engineering set up control program further enabling interactive computer controlled performance of the steps of:

selecting a first and second group of said processes; and

copying said subgroup name, process name denoting means, process availability denoting means and parameters values for the subgroups of pro-

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cesses in said first selected group into said second selected group.

9. The method of claim 4, including the steps of:

(e) establishing a set of predefined parameters for each of said process control programs;

(f) storing, for each of a multiplicity of specified processes, a set of parameter values for said predefined parameters associated with a specified one of said process control programs;

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(g) said engineering set up control program further enabling interactive computer controlled performance of the steps of:

selecting first and second ones of said processes; and

copying said process availability denoting means and parameters values for said first selected process into said second selected process.

\* \* \* \* \*

# **Exhibit 8**



**United States Patent** [19]

Pocock et al.

[11] **Patent Number:** 4,905,094[45] **Date of Patent:** Feb. 27, 1990[54] **SYSTEM FOR AUDIO/VIDEO PRESENTATION**

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[21] **Appl. No.:** 213,357

[22] **Filed:** Jun. 30, 1988

[51] **Int. Cl.<sup>4</sup>** ..... H04N 5/76; G11B 7/00

[52] **U.S. Cl.** ..... 358/342; 358/341;  
358/86; 358/335; 360/35.1; 360/72.1; 364/401;  
364/518

[58] **Field of Search** ..... 358/310, 335, 341, 342,  
358/343, 906, 909, 86; 360/10.1, 19.1, 72.1,  
72.2, 35.1, 9.1, 33.1, 39; 364/401, 518; 235/375,  
383

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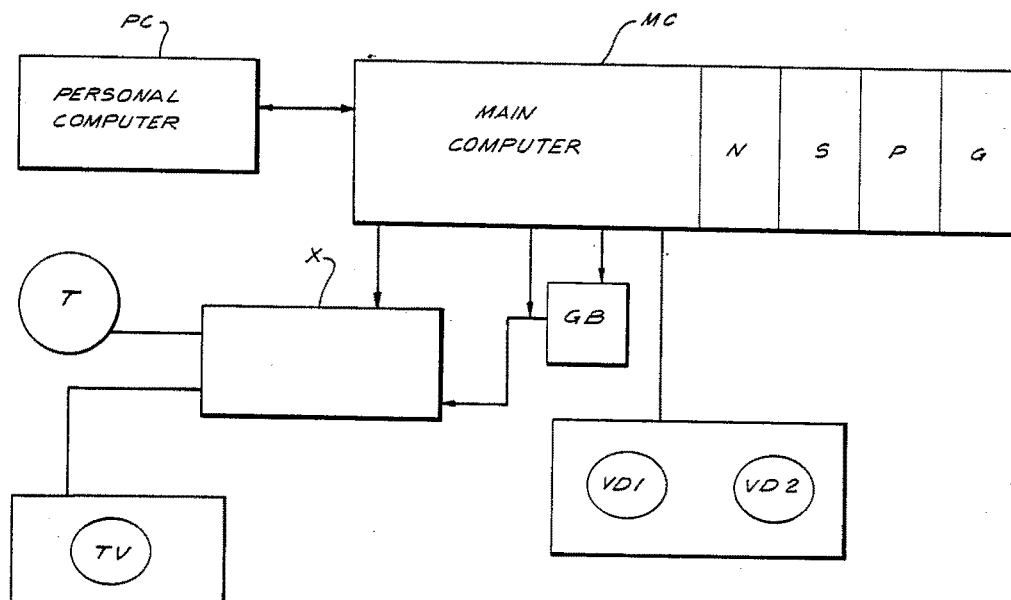
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*Attorney, Agent, or Firm*—Amster, Rothstein &  
Ebenstein

[57] **ABSTRACT**

The present invention relates to a system for assembling a network of presentations comprising still video images with associated audio messages. The video images and audio messages are first recorded on separate recording mediums and then combines as a video/audio presentation network recorded on a video disc. The video disc can then be incorporated as part of the data base of an interactive communication system which transmits the presentations to subscriber's of the system.

**13 Claims, 5 Drawing Sheets**



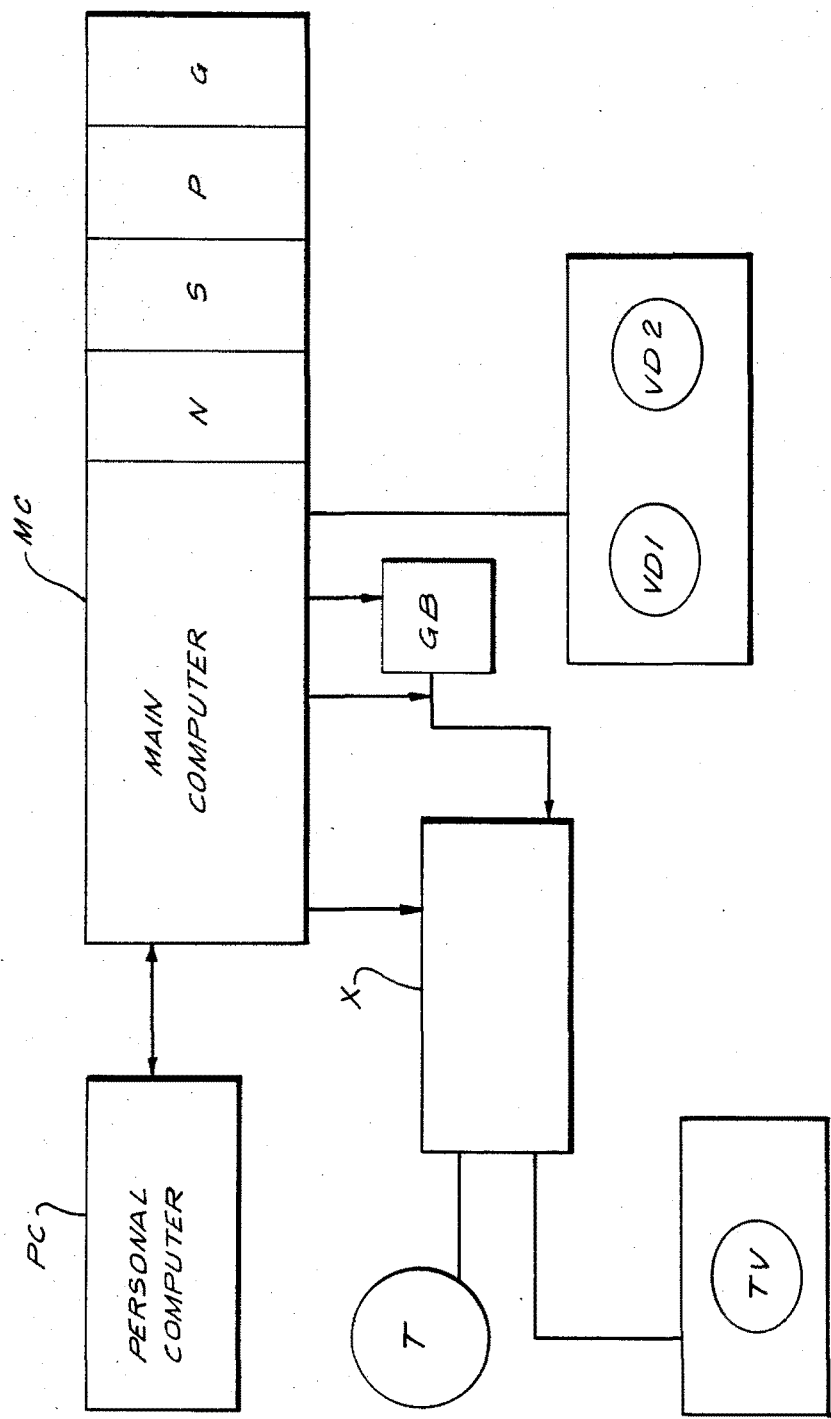


FIG. 1

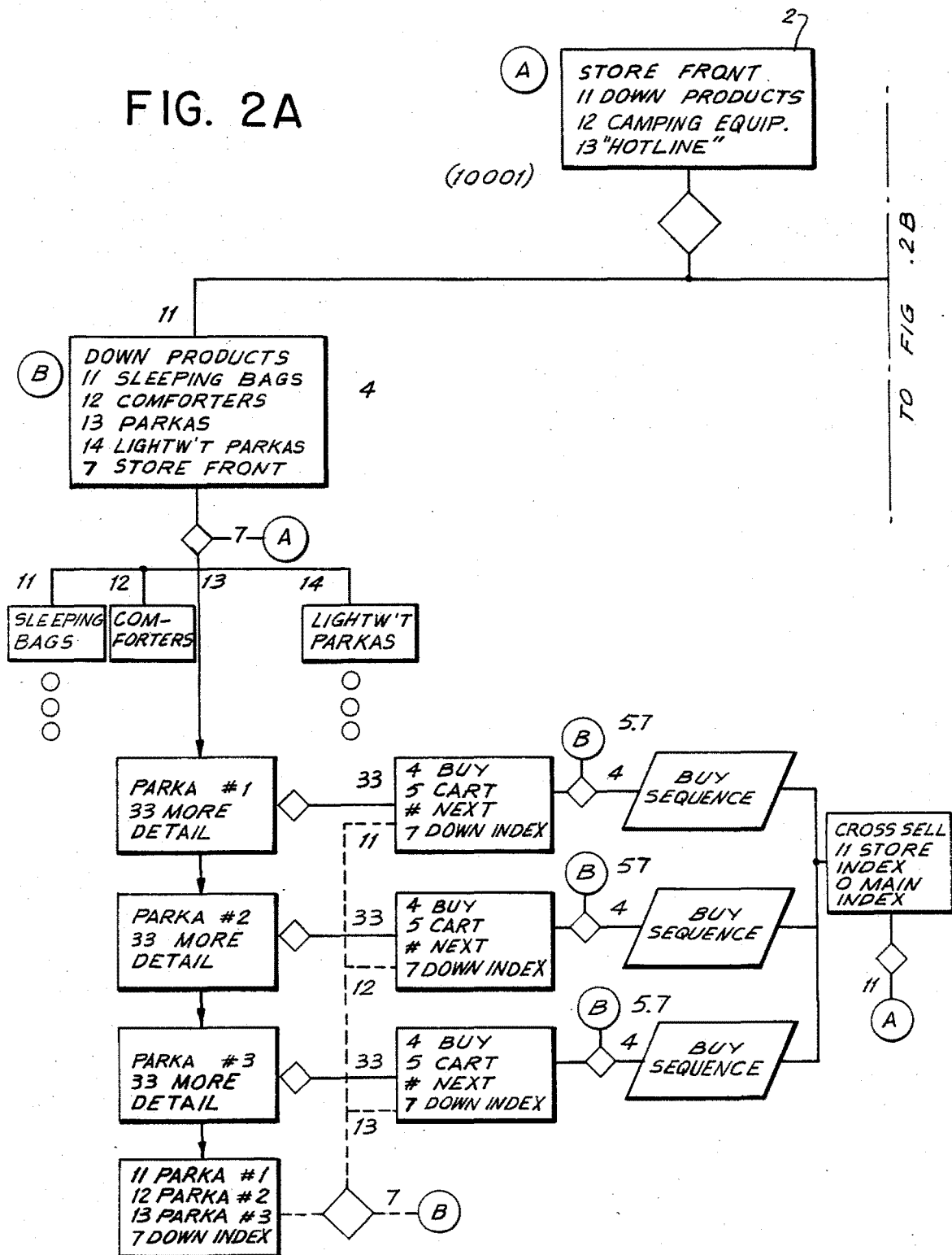
## U.S. Patent

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FIG. 2A



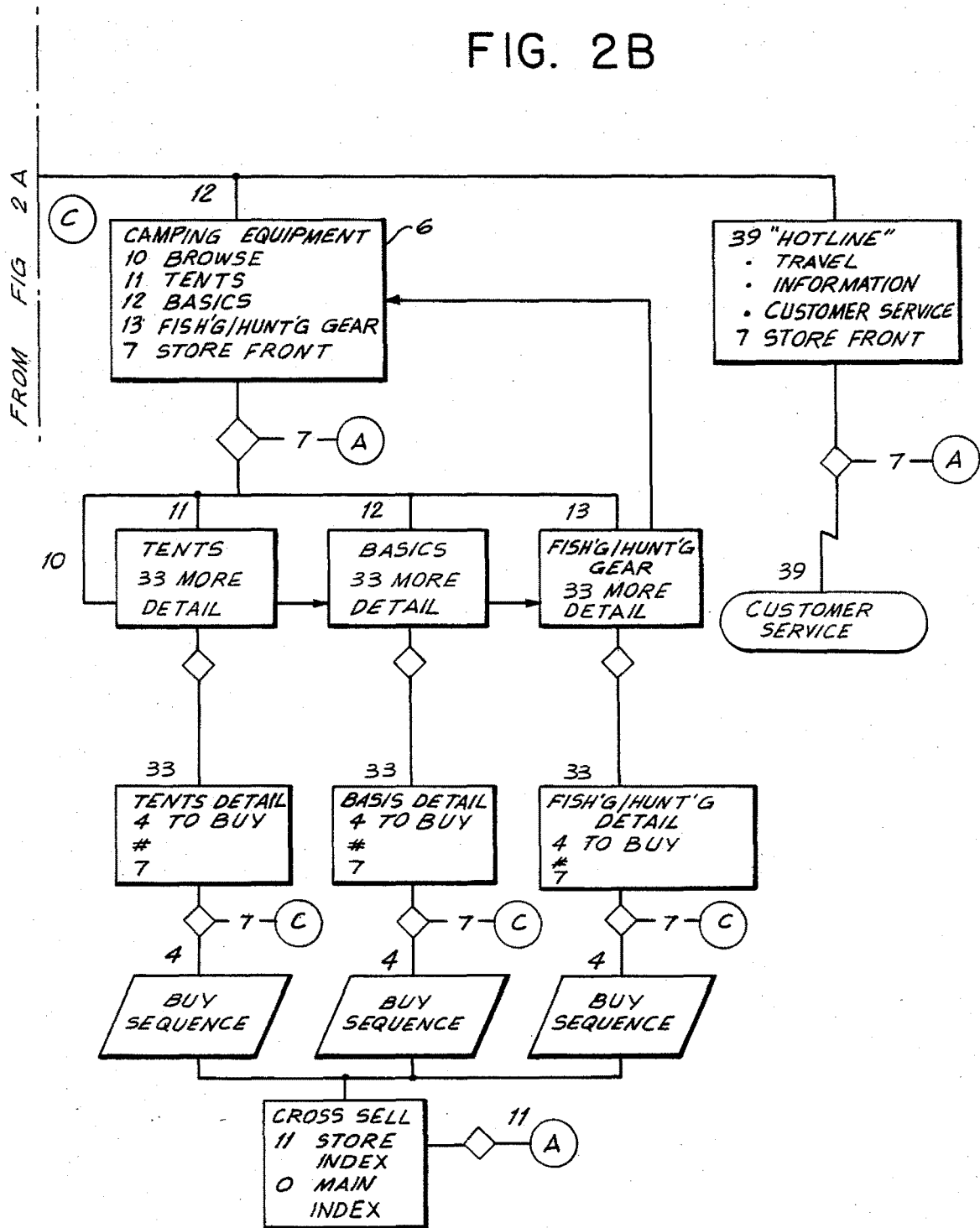
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FIG. 2B



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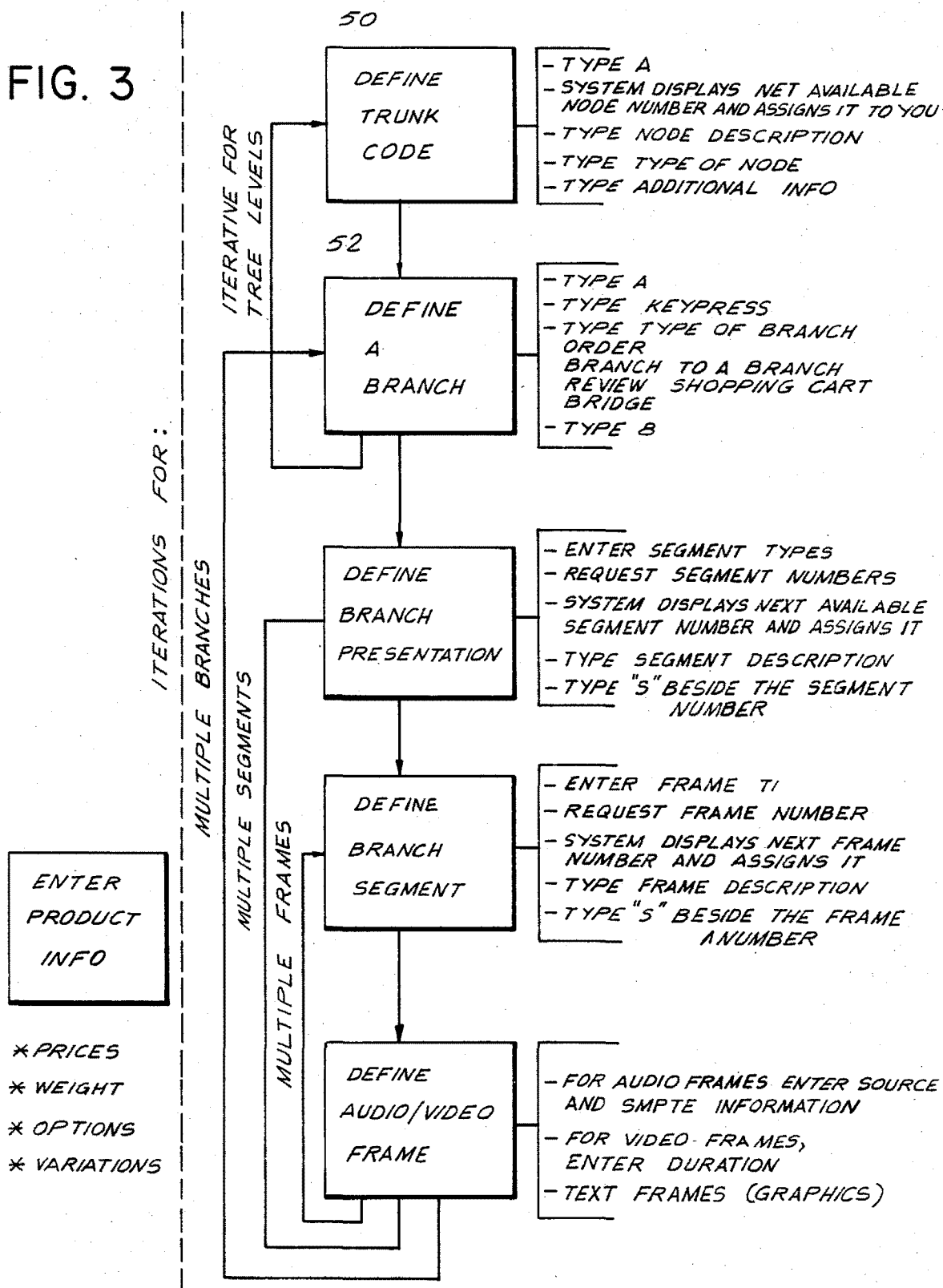
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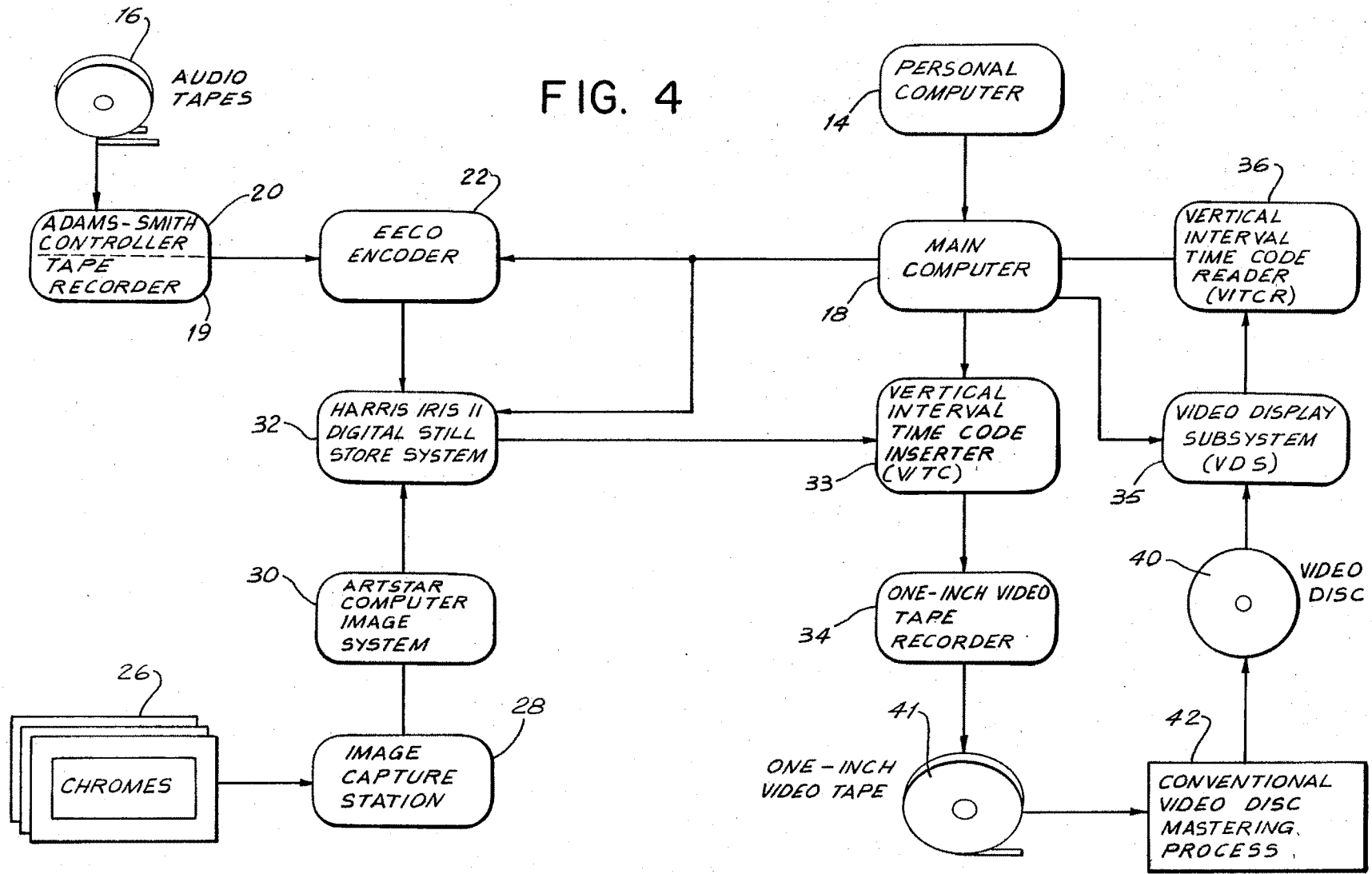
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## STORE DEFINITION CYCLE

FIG. 3





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## SYSTEM FOR AUDIO/VIDEO PRESENTATION

## BACKGROUND OF THE INVENTION

The present invention relates to the arrangement and storage of a video/audio presentation network on a medium from which it can be retrieved for viewing.

Systems whereby a customer can purchase goods and services with the aid of just his telephone and television receiver are known. Lists of items are presented on the subscriber's television screen and he selects the items he wishes to purchase by pressing indicated keys on his telephone. It has also been proposed that still pictures of the various items and an accompanying audio message can be stored on video discs and transmitted to the customer on demand, but this does not give him the impression that he is in an actual store. Furthermore, the information cannot be changed except by making a new video disc, and this can take nearly two weeks. Such a system has very little flexibility.

## BRIEF SUMMARY OF THE INVENTION

It is anticipated that the present invention will be used in conjunction with an interactive cable television system that has been developed to distribute information to subscribers' televisions at their request. Such system concerns a shopping service where subscribers shop at home through an "electronic mall". This system is distinguished from home shopping channels in that it allows the subscribers to select which products or services they will view on their televisions by use of in-home subscriber apparatus, such as telephones or CATV keypads.

In operation, the subscriber tunes to a channel and requests connection to a remote location by either dialing a predetermined telephone number, or accessing via a CATV reverse channel. As soon as the system identifies the subscriber, his television begins to display still frame video, and possibly accompanying audio information, and directories of "electronic stores" comprising products or services that may be either entered or passed, examined in further detail, saved for further consideration, or purchased just by touching keys on a touch-tone telephone or CATV keypad in response to prompts on the television screen. A main frame host computer controls the flow of information in this system. Such information includes the presentations representing the products or services offered to subscribers. These presentations are stored as optical signals on video discs and as digital signals on magnetic discs.

In order to give the subscriber the feeling that he is in an actual store, he is first presented with a segment comprised of a series of still pictures, and possibly an accompanying audio message that may describe the various departments or types of merchandise, that are available. At the same time, a menu may be displayed on his television screen naming the departments or types of merchandise he can view, and the combination of digits that must be pressed on his touch-tone telephone or CATV keypad in order to view them. When a combination of digits is pressed, a new segment of slides and possibly audio material are presented along with another menu. Each new segment or collection of segments comprising a presentation will be referred to hereinafter as a node. In effect, a video/audio presentation network is created which is essentially a tree of choices starting with a trunk corresponding to the main entrance, main limbs corresponding to the departments,

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and branches corresponding to different items in each department. Each presentation at a node in the network includes one or more video segments. A segment is comprised of one or more video images (still pictures) and possibly one or more audio images (audio messages.) The video image may be stored as a still frame and as graphics commands for computer-generated overlaid graphics. At appropriate nodes, one of the possible choices will be to go back a node closer to the trunk so that the customer will not be left out on a limb so to speak. The navigation permitted by the successive presentation of menus simulates very closely the experience of being in an actual store.

Flexibility in navigation is achieved by storing the possible menu in a changeable file in a main computer and providing means for altering the menus with a personal computer. The location on the video disc of the segment of stills and audio to be displayed at each node is recorded in a segment file stored in the main computer.

Sooner or later it is hoped that the customer will reach a point where he has decided on a purchase. He will then be presented information as to factors such as size, color and price that he must know before he can indicate a decision to buy. Such product information is stored in a product file in the main computer that can be changed by interaction with the personal computer. The product file may be limited to words that can be superimposed on a still picture derived from the video disc. Thus, it is possible to indicate a new price or to remove a specific item that is no longer available. More importantly, it is possible to add a new node to the navigation and write in new information about an item. To the extent desired, the product information file may include means for setting a CAD program in operation that will present drawings.

In accordance with another aspect of this invention, information as to the segment of still pictures and audio messages provided by the store management is presented in such form that it can readily be recorded on video and magnetic discs and in such manner that it can be correlated with the nodes encountered during navigation from node to node through the store i.e. the video/audio presentation network. Briefly, this is effected as follows. The store management provides a series of chromes or colored slides that may be an artist's version of each of the still pictures to be recorded on a video disc. Each of these chromes must be accompanied by descriptive words from which its order in a segment can be determined. After being converted to digital form in respective television frames, they are stored in the auxiliary storage of a Harris Iris II Digital Still Store System (Harris). The management must also supply audio tapes in which the SMPTE time codes for the beginning and end of each audio segment are known. A personal computer communicates with the main computer so as to set up an address in the navigational file for a node, an address in a segment in the segment file, and addresses in the product file for information on particular products. The personal computer is provided with the information as to the SMPTE time codes for the beginning and end of each segment.

The audio processing begins by recording the audio tape or tapes on a conventional tape recorder operated by a controller. Segment files identifying each segment in the presentation network are stored in the personal computer and the main computer. The main computer

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instructs the controller to cue to a certain location on the audio tape based on information from the segment file which specifically identifies each audio cut by SMPTE time codes. When the start time of an audio cut is reached on the audio tape, the main computer instructs an encoder to begin encoding the audio cut. The encoder takes the audio signals from the tape recorder and transforms them into a format comparable to video frames. These video formatted audio frames are then stored in the internal memory of the encoder. When all of the audio cut has been transformed by and stored in the encoder, the main computer instructs the encoder to send the audio frames to the Harris where they are stored in its auxiliary storage, but on a disc separate from the disc on which was recorded the video frames. The audio frames stored in the Harris are stored with identification codes designated in the segment file. With both the video and audio frames stored in the Harris, the main computer instructs the Harris to assemble the audio and video frames as video/audio segments on a one-inch video tape. On the video tape, the audio frames representative of a segment are serially recorded, followed by the serial recording of the video frames. Each segment typically comprises one to five video frames and zero to four audio frames.

The frames are then recorded onto the one-inch video tape in the following manner. The SMPTE time code for each frame is transmitted from the main computer to a Vertical Interval Timing Code Insertion device (VITC). The main computer instructs the Harris to send the frame to the VITC inserter. Next, the VITC inserter inserts the time code into a line of the vertical interval of the frame just received in a manner which can be both recorded onto a video disc and also detected and read in digital form from the recorded video disc, thus tagging it for future identification. The VITC inserter transmits the newly tagged frame to the one-inch video tape recording device where it is recorded. The main computer then stores the frame identification together with the SMPTE time code for later use in verifying that the video disc recording was done without missing frames and to determine which frames reside on which video disc tracks.

As recorded on the one-inch video tape, the audio and video frames are thus identified according to the identification codes of the segment file in the main computer. The segments stored on the one-inch video tape are recorded on to a video disc using a conventional video disc mastering process.

After the video disc has been produced, it is then inserted into one of the video disc players in the Video Display Subsystem (VDS) of the interactive communication system. The main computer directs the VDS to read the tracks of the disc one by one. As each track is read, a Vertical Interval Time Code Reader device (VITCR) detects and reads the SMPTE time code information recorded during the premastering process. Each time code is then transmitted to the main computer where it is matched with its stored counterpart. The track number from the code—and thus the corresponding frame—is then matched to the expected track number. Any mismatches are reported and the new track number used to replace the stored track number. The contents of the video disc and the main computer files are thus coordinated.

The SMPTE time codes are also used in verifying the operation of certain hardware and software comprising the interactive communication system. Here, the time

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codes are sent by the VITCR to the main computer as product or service presentations and menus are displayed as a result of user telephone touch tone input. The main computer records the time code information for later use to determine whether the correct frames were displayed for the touch tones generated by the user.

An object of the present invention is to provide an efficient system whereby a video/audio presentation network can be designed and stored on a medium from which it can be readily retrieved for viewing.

It is a further objective of the present invention to provide a means for designing and storing a video/audio presentation network that can be used in conjunction with an interactive communication system for merchandising products and services.

The present invention is directed to a system for providing a retrievable network of video presentations. Each such video presentation includes one or more video images which may be associated with an audio segment. A network of video presentations is stored on a retrievable storage medium and incorporates a plurality of permissible paths between the video presentations.

The system includes a means for storing a plurality of video images on a first recording medium and a means for storing a plurality of audio segments on a second recording medium. In a data base, the permissible pathways between video presentations in the network are defined, as well as the association between audio frames, if present, and one or more of the video images. The system further includes a means for storing on a third recording medium a plurality of video images with associated audio frames according to instructions defined in the data base. The video images and the associated audio images are stored on the third recording medium as video frames with each of the frames being electronically identified for retrieval.

#### BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a block diagram of an electronic store.

FIGS. 2(A) and 2(B) illustrate various nodes encountered in navigating through a fictitious store call The Great Outdoors.

FIG. 3 illustrates how the navigational information can be formed on the navigational file.

FIG. 4 is a block diagram illustrating the premastering process which forms the video and audio frames on a magnetic tape that can then be recorded on a video disc.

#### DETAILED DESCRIPTION OF THE INVENTION

Reference is made to FIG. 1 for an overall description of the operation of an electronic store that is the subject of this invention. A personal computer (PC) that is in communication with a main computer (MC) establishes addresses of nodes in a file N, addresses of corresponding segments of information in a file S and product data such as size, color, price, etc in a file P. When a customer gets in contact with the telephone exchange X through his telephone T, he then presses keys identifying the presentation network representative of the store through which he wishes to shop. This causes MC to identify the address of the first node, which is probably the entrance to the electronic store, and the address of the corresponding segment of video and audio information that is to be represented at that node. With this

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information, MC sends the menu for the first node to the customer's TV set. MC also identifies the location on a video disc, VD1 or VD2, of a segment of video and audio frames that is to be presented at this node, as well as any graphics commands G. If there are graphics commands, they are transmitted to a graphics display board GB for interpretation and drawing of the picture, which is combined with the still video prior to being sent to the customer. They are then transmitted so as to be displayed on the television set.

Not all nodes will require product information, but when the customer gets to a point of picking out size, price and color at a particular node, the appropriate product information will be transmitted to the TV set. All information in the files N, S, G, and P can be readily changed.

Reference is now made to FIGS. 2(A) and 2(B) which are a flow chart showing several nodes in the presentation network of a fictitious store called The Great Outdoors. When the customer initials access to this store (either directly or from a "mall"), the menu shown in block 2 appears on his television screen along with the first segment for the store which includes a series of still pictures and an audio message.

From block 2 there are three nodes to which the customer can go: Down Products by pressing 11 on his telephone, Camping Equipment by pressing 12 and Hotline by pressing 13. If he presses 11, the main computer will cause the menu in block 4 to appear on the television screen. Segments depicting products listed in the menu can be accessed by pressing the telephone keys representing the number shown next to the listed product. Accessing segments is done by identifying the address of the segment on the video disc. With the above explanation, the remaining blocks in FIGS. 2(A) and 2(B) are self-explanatory. Note, however, that the navigation permits return to an earlier node, e.g., an opportunity is given to go back to the beginning of the store's presentation network.

Reference is now made to FIG. 3 for a description of how a personal computer can organize the nodes of a presentation network and identify segments to be displayed at each node in the network. In general, this is accomplished by correlating addresses in the personal computer's navigation file with addresses in its segment file. These files are also stored in the main computer.

The manner in which the first node, which is the trunk of the tree, is defined as shown by block 50 of FIG. 3 and the accompanying instructions. An "A" is typed on the keyboard of the personal computer, and the main computer provides the personal computer with the next address in its navigation file N, such as 10001 which is indicated in FIGS. 2(A) and 2(B) as the address of block 2. The name of the store such as The Great Outdoors would then be typed in along with an identification that this is the "entry" to the store, designated by entering a node type of "1". Additional control information is also entered.

With the "trunk" identified, the system is then used to attach "branches" to the trunk. For each branch, an "A" is again typed followed by a number such as 11 and a description of a branch such as Down Products as indicated by the instructions accompanying block 52. The process then proceeds to block 54 by typing the number "8". The presentation components for the system are then displayed. A segment may be added by typing an "A", followed by the segment type. The computer responds with the next available segment in

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segment file "S". The segment description is then entered next to the number. A typical description might be "Down Jackets—Seg. #1". The system then adds the segment to the file. Next, "S" is typed beside the segment number to transfer it to the segment screen. This screen allows the user to enter a request for frame numbers and type in a frame description that may be used later to relate the number to the actual chromes. A list of all frame numbers, and to their descriptions may be printed to allow manual tagging of the chromes with their system assigned number. With the frame numbers added, an individual frame may be selected to add information by typing an "S" beside it. An additional screen is presented which then allows for entry of the duration for video frames and source and SMPTE for audio "frames". Control is returned to block 52 by typing a series of "X's", where "A" may be typed, and the process is repeated until all branches and their associated segments have been treated in a like manner.

Reference is now made to FIG. 4 for a description of the premastering operation of this invention whereby the video and audio frames for each segment in the presentation network are recorded on a one-inch magnetic tape. The video and audio frames representative of each segment are recorded from the magnetic tape onto a video disc.

The company desirous of offering its products or services through the interactive communication system previously described develops a video/audio presentation network of its "electronic store" by developing segment, navigation and product files in a personal computer. Along with the files developed in the personal computer, the company reduces each video image of a segment to a color slide or chrome, and produces an audio tape or tapes of the various audio segments associated with the chromes. Thus, the presentation network that the company has designed comprises a plurality of nodes each of which represents a video presentation. Each of the video presentations includes one or more video segments. In turn, each video segment comprises one or more video images, i.e. still pictures and/or accompanying computer graphics, which may be accompanied by an audio segment. Typically, the video segments comprise one to four still pictures with up to 40 seconds of an accompanying audio segment.

As to the specific files generated in the personal computer, they represent information needed in organizing and defining the various video and audio segments of the presentation network. The segment file identifies each of the segments, which include video frames and audio frames. Each segment is identified by a unique identification number. For example, the first three places in the identification number may be abbreviations for the particular company, and the next six numbers may represent the specific segment. Thus, for example, the identification number TGF200001 represents segment 200001 of The Great Outdoors store. The identification number is further defined by the first video image in a segment by the designation V1 after the identification number, and a subsequent video image would be identified as V2, and so on for other video images. Any audio frame associated with a segment would be identified by the segment identification number, and "A" indicating an audio frame and a SMPTE time code which indicates the beginning and end of the audio frame.

The navigation file identifies the pathways between the nodes in the presentation network. As for the prod-

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uct file, it provides a written description of the product being offered such as its color and sizes. The segment, navigation and product files comprise a data base generated by operation of the personal computer 14. This data base is also loaded into the main computer designated as 18 in FIG. 4. With the data base stored in main computer 18, the chromes designated 26, and the audio tapes designated 16, the premastering operation results in the recording of the video/audio presentation network on a video disc from which segments of the network can be retrieved for viewing.

In the premastering operation, the chromes 26 are electronically recorded by a color video camera at the Image Caption Station 28. The color video camera, such as a Sony DXC/3000P, records the video image from a chrome 26 in the form of an analog signal and transmits this signal to an ArtStar Computer Image System (ArtStar) 30. The ArtStar 30 is a video composition system used primarily in the production of animation films, and comprises generally the following components: a computer processing unit, a keyboard, a data monitor and a color monitor, and a bit pad. By using ArtStar 30, the image originally captured in chrome 26 can be modified such as by changing the color of components in the image, or by changing the configuration of objects in the image. In general, ArtStar 30 has the capability of making almost any type of modification to the image captured from chrome 26. The output of ArtStar 30 is an analog signal which is sent to a Harris-Iris II Digital Still Store System (Harris) 32. In Harris 32, the analog signal from the ArtStar 30 is received by a frame synchronizer which converts the analog signal into a digital signal. This digital signal is then stored in the Harris auxiliary storage. The video frame stored in Harris 32 is identified by the same identification number that the chrome 26 was identified by in the segment file stored in main computer 18. For example, the first three characters in the identification number may represent the particular company developing the presentation network, the next six numbers could represent the specific video segment, and the remaining characters would include the letter "V" and the number representing a specific video frame in that segment.

The audio tape 16, which includes a series of audio cuts, is placed in a conventional tape recorder/player 19 operated by an Adam Smith Controller System (Adam Smith) 20. Adam Smith 20 receives its operating instructions from the main computer 18. In its first commands to the Adam Smith 20, main computer 18 instructs the Adam Smith 20 to cue to a certain location on the audio tape 16 based on information from the main computer's segment file. In this instance, cuing means to find the starting location of a specific audio cut on the tape 16 and pre-rolling the tape 26 for approximately five seconds. When the start time of an audio cut is reached on the tape 16, main computer 18 instructs an EECO Encoder 22 to begin encoding the audio cut. The EECO Encoder 22 takes the audio signal from the tape recorder/player and transforms it into video frames. Each video frame typically has no more than 10 seconds of audio recording. Also, EECO Encoder 22 stores the audio frames in its internal memory until it has captured the entire cut, which does not typically exceed 40 seconds or 4 frames. At such time, main computer 18 instructs EECO Encoder 22 to display the first video frame representing the audio cut it has just recorded. Concurrently, the main computer instructs the Harris 32 to store the audio frames (which are in a video

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frame format) in its auxiliary storage, but on a disc separate from the disc on which was stored the video frames. The audio frames stored in Harris 32 are recorded along with identification numbers the same as the identification numbers originally designated for the audio cut in the segment file. Thus, for example, the encoded audio frames could have identification numbers where the first three characters represent the company having developed the audio cut, the next six segments would represent the segment identification number, and the remaining characters would include the letter "A" and the number of the specific encoded audio frame.

After all the video and audio frames have been stored in Harris 32, main computer 18 instructs Harris 32 to assemble the video and audio frames as video/audio segments on the one-inch video tape of recorder 34. In the process of assembling the segments, main computer 18 instructs recorder 34 to capture a single frame at a time.

Main computer 18 transmits the SMPTE time code for each image to the Vertical Interval Time Code Insertor (VITC) 33. The Harris 32 then transmits the image to VITC 33 on cue from main computer 18. VITC 33 encodes the time code into one of the lines in the vertical blanking interval for the frame as it is being transmitted through VITC 33 to the one-inch video tape recorder 34. Main computer 18 also stores the time code and the anticipated video disc track number onto which the frame will be recorded with the frame identification for later verification as described below.

This process is first repeated for all the encoded audio frames and then likewise for all the video frames. Typically, a segment comprises one to five video frames and zero to four encoded audio frames.

After all segments have been recorded on one-inch video tape 41, the one-inch video tape 41 is used in a conventional video disc manufacturing process 42 to produce video disc 40.

Video disc 40 is then inserted into one of the video disc players in Video Display Subsystem 35 of the interactive communication system. Main computer 18 causes Video Display Subsystem 35 to read each track in turn, beginning with track number 1 of video disc 40. The video output signals of Video Display Subsystem 35 are intercepted by Vertical Interval Time Code Reader (VITCR) 36 which detects, digitizes and transmits the previously recorded SMPTE time code to main computer 18. Main computer 18 compares the time code so received to the time code value previously recorded for each track anticipated for video disc 40. Any mismatches are reported, and main computer 18 files are updated with the correct track for the frame so that correct track references are available when required for presentation.

Video disc 40 becomes part of the data base of the interactive communication system which transmits the presentations stored on video disc 40 to subscribers. The files stored in main computer 18 are utilized by the interactive communication system to identify the location of specific segments on video disc 40 and to define the navigation between such segments.

Although the illustrative embodiment of the present invention has been described in detail with reference to the accompanying drawings, it is to be understood that the invention is not limited to this precise embodiment and that various changes or modifications may be ef-

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fectured therein by one skilled in the art without departing from the scope or spirit of the invention.

What is claimed is:

1. A system for providing a retrievable network of video presentations, each such video presentation including one or more video images which may be associated with an audio segment, said network of video presentations being stored on a retrievable storage medium and incorporating a plurality of permissible pathways between said video presentations, said system comprising:

means for storing a plurality of video images on a first recording medium,

means for storing a plurality of audio segments on a second recording medium,

means for defining in a preselected format said permissible pathways in said network between said video presentations, and the association between each said audio segment, if present, and one or more of said video images, and

means for storing on a third recording medium said plurality of video images with said associated audio segments according to said defining means, said video images and said associated audio segments being stored on said third recording medium as video frames with each said video frame being electronically identified for retrieval.

2. The system according to claim 1 further comprising:

means for recording on the tracks and associated frames of a video disc said video images and audio segments stored on said third recording medium, wherein each frame includes frame identification information recorded in the vertical blanking interval thereof.

3. The system according to claim 2 further comprising:

means for detecting and reading said frame identification information recorded in the vertical interval of each frame on a track of said video disc.

4. The system according to claim 3 further comprising:

means for comparing said detected frame identification information to a previously recorded file of frame identification information, and correcting said file where said detected frame identification information does not agree with said previously recorded frame identification information.

5. The system according to claim 4 wherein said correction of said file being due to manufacturing errors in said video disc.

6. The system according to claim 1 wherein said first recording medium is a magnetic disc.

7. The system according to claim 1 wherein said second recording medium is a magnetic tape.

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8. The system according to claim 1 wherein said third recording medium is a video tape.

9. The system according to claim 1 wherein each video presentation includes one or more video segments, each video segment includes one to five video images which may be associated with an audio segment, said audio segment being approximately 40 seconds or less in length.

10. The system according to claim 1 wherein said means for defining the permissible pathways in said network is in a data file stored in a computer controlling a recording means associated with each of said first, second and third recording medium.

11. The system according to claim 1 further comprising means for transferring said plurality of video images and associated audio segments from said third recording medium to a video disc.

12. Apparatus for recording segments of audio and video information onto respective frames of a magnetic tape comprising:

an audio tape having SMPTE time codes identifying the ends of audio information that is to be used in a given segment,

an encoder for translating audio signals into a video frame format,

a plurality of chromes,

means for scanning a chrome so as to produce a frame of analog video signals,

means for translating the analog video signals into corresponding digital video signals,

means for altering said digital video signals so as to form a frame having a desired image,

means for combining the audio and video frames into a series for a given segment,

means for converting digital video frames into corresponding analog video frames, and

means for recording said series of analog frames onto a magnetic tape.

13. Method for creating still-video and audio presentations stored on a video disc, comprising the steps of:

(a) designing a plurality of still-video frames;

(b) storing in the form of digital information the video frames on a first storage medium;

(c) identifying each of the video frames on said first storage medium with a unique address;

(d) composing an audio message to be associated with said still-video frames;

(e) electronically storing the audio message in the form of audio frames on a second storage medium;

(f) identifying each audio frame on the second storage medium with a unique address;

(g) combining the still-video frames on said first storage medium with the audio frames on said second storage medium to form a still-video/audio presentation on a video disc.

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